Metals Review
THE NEWS DIGEST MAGAZINE

Volume XXIV - No. 12 December, 1951

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from the staff of

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Plan Now to Attend

A.S.M. MIDWINTER MEETING

William Penn Hotel, Pittsburgh, Pa.

January 31 and February 1, 1952

Timely and important problems in high-temperature metallurgy, titanium, and other aspects of strategic metal conservation and substitution will be threshed out before the Midwinter Meeting of the American Society for Metals in Pittsburgh. Scientific and physical metallurgy of these problems will be treated in the 17 technical papers to be presented during the two-day session. All of the papers have been preprinted in accordance with the list published in the October issue of *Metals Review*.

Decision to hold a midwinter meeting as a supplement to the annual meeting at the National Metal Congress in October was made by the Board of Trustees as a means of handling the large number of meritorious papers that are now being submitted to the A.S.M. Publications Committee. All of the papers will be published in the 1952 volume of the A.S.M. *Transactions*.

An opportunity to hear these papers personally presented and to participate in the discussion adds immeasurably to their value to the individual. Likewise, the meeting will provide invaluable contacts with speakers and other experts in attendance. All A.S.M. members are cordially invited to attend.

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DIRECT TO THE HOTEL, ADDRESSING
WILLIAM PENN HOTEL, PITTSBURGH
and Specifying That You Will Attend the Midwinter Meeting of the American Society for Metals, Jan. 31 and Feb. 1, 1952

AMERICAN SOCIETY FOR METALS

Metals Review

THE NEWS DIGEST MAGAZINE

VOLUME XXIV, No. 12 DECEMBER, 1951

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NATIONAL METAL CONGRESS & EXPOSITION

Convention Halls, Philadelphia • October 20-24, 1952

Competition for Students at the 1952 Metallographic Exhibit

THE DETAILS ▸

Undergraduates can now compete on an equal basis at the metallographic exhibit held each year at the National Metal Congress and Exposition without limitations as to subject matter or techniques. Separate panels will be erected for adequate display of their best work. It is not necessary that the Entry show anything novel in microstructure or techniques; Excellence of student performance in the school's laboratory will be judged by the same jury which appraises the work of professionals. Prizes will be awarded as follows:

First Prize—Bronze Medal and $25 cash.
Honorable Mentions—Ribbon and $10 cash.

THE RULES ▸

Entrants are restricted to undergraduate students of academic institutions. ¶No more than two entries will be accepted from a single student. ¶Work must be done during the current academic year. ¶ Entries must be mounted separately on stiff cardboard. ¶ Each mount must contain pertinent information regarding subject, etchant, magnification, and special techniques (if any). ¶ Maximum size of mount, 14 x 18 in. ¶ Entrant must sign mount and give name of institution, course being studied, and year of graduation. ¶ Mount must be signed by department head, as evidence that the above conditions are met.

Send Entries (BEFORE SEPTEMBER 1, 1952) to

METALLOGRAPHIC EXHIBIT—*Student Division*

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A.S.M. Annual Meeting

Reports of the President, Secretary and Treasurer; Election of Officers

THE ANNUAL MEETING of the American Society for Metals was held in Detroit on Wednesday morning, Oct. 17, 1951, during the National Metal Congress and Exposition.

President Jominy presented the slate of new officers nominated last May (see *Metals Review,* June 1951). No additional nominations having been received, the secretary cast the unanimous vote of the members for these candidates.

Annual reports of the president, treasurer and secretary were presented, and are reproduced in summary below. They will be published in full in the next volume of the A.S.M. *Transactions.*

PRESIDENT'S REPORT

Presented by W. E. Jominy
Staff Engineer
Chrysler Corp.
Retiring A. S. M. President

Few experiences that come to any man are as pleasant and satisfying as the privilege I have had in serving as president of the American Society for Metals. In traveling through our country attending chapter meetings, as well as regional and national meetings, I have been constantly impressed with the high caliber of the people who compose our Society. . . .

A little over a year ago the Board of Trustees suggested that the President limit his chapter visits to about 25 in order to lighten his load. In compliance with this suggestion, I visited 27 chapters during the past year and attended two regional meetings in addition to the Western Metal Congress. . . .

Members of the Board of Trustees visited 17 chapters, and I want to thank them for their help in speaking at the National Officers' Night meetings of these chapters. I would also like to thank the Board of Trustees for their stimulating ideas and help in conducting the affairs of the Society.

The Board of Trustees has had five meetings during the year. Some of the important matters which they considered included financial and investment problems and means of bettering the services of the national office to the members through the chapters. Of the former you will hear more from the treasurer and I will merely say we are in good financial condition.

In studying means of improving our services, many matters were considered. A national committee was appointed to investigate ways of improving chapter meetings and of attracting large attendances. As a result of the recommendations of this committee, the Board of Trustees has requested several meetings next year at which representatives of the Board of Trustees will meet with the chairmen and vice-chairmen of chapters in a chosen district to discuss chapter problems.

In addition, the national trustees have considered carefully the matter of giving more attention to junior members. To help these young men in obtaining their first professional position and also to help industry find suitable men for its needs, we published this year pictures and qualifications of all junior members obtaining degrees in metallurgy.

To encourage teachers of metallurgical subjects the trustees have created a teaching award of $2000 for teachers adjudged worthy by reason of their teaching performance. This will be called the American Society for Metals' Teaching Award in Metallurgy and is intended for younger men. The Trustees also decided to publish some of our technical books with paper bindings for distribution to junior members at a decided reduction in price.

To help chapters holding regional meetings defray the higher costs of printing and other attendant financial requirements for holding these meetings, it has been decided to increase the contribution of the national office to $300. Three or more chapters must participate in the regional meeting to be eligible for this contribution.

To stimulate educational meetings which have been of so much value to many chapters, the trustees have decided to contribute $100 to any chapter giving an educational course of not less than three lectures.

After long study and deliberation the trustees have decided to sponsor a new "Journal of Metal Science." Other societies will be invited to help make this journal international in scope. It will carry articles on theoretical and advanced metallurgy for which there seems to be no present outlet. Articles published will be similar to those presented at the seminar meetings of the Metal Congress. It is anticipated at this time that the Journal of Metal Science will be sent only to those members of our Society who request the publication and who are willing to pay a subscription fee.

The Society received notice this year that its income tax exemption was being reconsidered by the Income Tax Bureau. A new tax law has been enacted which gives the Income Tax Bureau the authority to review the income of tax-exempt bodies each year. We have been informed that this matter will now come up each year in accordance with the new tax law. Representation has been made to them that we are an educational society, pointing out our past performance and submitting our proposed future plans.

The highlight of this year is the World Metallurgical Congress. . . . The American Society for Metals is proud to have sponsored this meeting and we sincerely hope it will not be the last.

This year we have planned a midwinter meeting at Pittsburgh to take care of the papers which could not be fitted into the program of this Metal Congress. . . . The midwinter meeting has been planned for Jan. 31 and Feb. 1, 1952. There will be no exposition at Pittsburgh. . . .

The Western Metal Congress was held the week of March 17, 1951, in Oakland, Calif. A number of panel discussions were featured at this meeting. . . . Papers on many subjects . . . were presented. A great deal of interest was shown in the exposition.

During the present period of military preparation, our Society has been anxious to help our Government whenever it could. . . . Our offer to help has been accepted by the Metallurgical Advisory Board who assigned several mechanisms used by the Navy for our study and for recommendations of materials and processing. We immediately appointed a President's Panel composed of 54 men recommended by the chapters from which committees have been appointed for specific jobs. Taylor Lyman of our

central office has been assigned to act as secretary of these special committees.

I should like to express a word of appreciation to Elmer Gammeter and Tom Digges who are retiring members of the Board of Trustees. They accepted willingly every job assigned to them and contributed real help.

It is customary for the president's report to record the awards given at the last convention. In Chicago in 1950 the President's Medal was awarded to H. K. Work of New York University. The Sauveur Award was presented to Clarence E. Sims of Battelle Memorial Institute, and the Howe Award to W. O. Binder, C. M. Brown and Russell Franks, all from Union Carbide and Carbon Corp. The Award for Advancement of Research was made to Charles E. Wilson, president of the General Motors Corp. Prof. Axel Hultgren of Sweden was elected an honorary member of the Society.

I wish to extend on behalf of the Board of Trustees our thanks for their fine cooperation to the participating societies: the American Institute of Mining and Metallurgical Engineers, the American Welding Society, the Society for Non-Destructive Testing and the Special Libraries Association. Their programs have contributed much to the success of this Congress.

In closing, I should like to repeat that it has been a pleasure to serve our Society. I am greatly indebted to our efficient and well-integrated national office staff and especially to our outstanding secretary, Bill Eisenman. They have had a tremendous load to carry because of the World Metallurgical Congress and the other new activities introduced this year. They have accomplished their tasks well.

TREASURER'S REPORT

Presented by Ralph L. Wilson
Chief Metallurgical Engineer
Timken Steel & Tube Div.

Your Society has again had a very satisfactory year of operations. . . .

Carrying value of all securities now amounts to $1,723,039.05, an increase of $272,371.74. This increase has come mostly from purchase of short-term securities, some of which will mature this year. It does not represent an appreciation in the dollar value of investments. Cash has decreased by $46,092.28, which was due to keeping available funds as fully invested as possible while maintaining adequate amounts for current needs.

There has been no fundamental change in the investment policy for the portfolio of securities within the past year. . . .

The market value of all the securities on Aug. 31, 1951, was approximately $1,979,178.38 including accrued interest on bonds. Stocks were about 38% of the total. Dividends and interest earned amounted to $71,375.08 or 4.16% based on the carrying value as compared to 3.92% for last year. The somewhat larger proportion of stocks and the increase in yield both reflect the conservative change in the relative holdings of bonds and stocks made the year before.

Total income and expense for the year ending Aug. 31, 1951, were:

Income	$1,052,082.84
Expense	946,775.61
Net Income	**$ 105,307.23**
Appropriated for educational purposes	90,770.51
Unappropriated net income	**$14,536.72**

The income dollar of the Society may be divided as follows to indicate the sources of income and the various expenditures.

Where it came from	
METAL PROGRESS	36c
Metal Expositions	24
Membership Dues	20
Book Publishing	7
Interest and Dividends	7
METALS HANDBOOK	3
METALS REVIEW	2
Miscellaneous	1
	100

Where it went	
METAL PROGRESS	32c
Metal Expositions	19
Dues Returned to Chapters	8
Books and Misc. Mdse.	6
Membership Expense	4
METALS HANDBOOK	2
METALS REVIEW	5
Transactions	4
Educational Projects	8
General Administration	11
Added to Surplus	1
	100

In the description of the various expenditures, the item called "educational projects" appears for the first time in the annual report. Included here are appropriated but unexpended funds for the new Journal of Metal Science, committees to work with the Metallurgical Advisory Board of the National Academy of Sciences, the new ASM Teaching Awards in Metallurgy, additional chapter educational activities and an appropriation of $25,000 for the World Metallurgical Congress. There will undoubtedly be a further large sum of money expended in the present fiscal year to cover the final expenses of the World Metallurgical Congress.

Dues paid by members are still the largest source of net income to the Society. Gross income from dues was $225,311.06 of which $93,243.02 was returned to the local Chapters. The combined assets of the Chapters have risen to about $219,000, which is an increase of approximately $14,000 over the previous year. This augurs well for the ability of the local groups to carry out their usual programs of activities. Including the sums returned to the Chapters, the Society has spent $47 per member to cover all the services provided in the fiscal year just ended.

Next to the dues paid by members, dividends and interest earned on investments have this year for the first time exceeded the net income from other sources. However, the Chicago and Oakland Metal Expositions were not far behind. For METAL PROGRESS, excess of income over expense was up to $41,740.85 from $29,269.26 the year before. TRANSACTIONS and METALS REVIEW, which are not self-supporting, were distributed at a net cost to the Society of $31,865.52 and $19,921.56, respectively.

The METALS HANDBOOK reserve, to be used for the publication of the next revision, was increased by $19,350 during the year, bringing the total amount to $86,489.50.

It seems proper to recognize that the successful operation of the Society year after year is a tribute to the good management of Secretary Eisenman. Your treasurer would like also to acknowledge the kindly assistance he has received from many associates during his term of office. Particular thanks are due to Secretary Eisenman, Assistant Treasurer A. A. Hess, Messrs. W. W. Horner and A. W. Marten of the Cleveland Trust Co., fellow members of the Finance Committee and the Board of Trustees.

SECRETARY'S REPORT

Presented by W. H. Eisenman
Secretary, American Society for Metals

This is the thirty-third time that I have presented the annual secretary's report, and I hope I will have the pleasure of presenting 33 more secretary's reports.

The American Society for Metals on Oct. 1, 1951, had a total membership of 20,254. Of this number 17,177 or 84.8% were regular members, 1830 or 9% were sustaining members, 1159 or 5.7% were junior members. There were 52 honorary and life members and 36 on the free (armed services) list. . . .

Transactions — Since the last National Metal Congress, Vol. 43 and Vol. 43A of the *Transactions* were published and distributed to the membership in April 1951. Vol. 43 totals 1245 pages and constitutes 51 articles with their discussions. It contains all of the papers presented at the Oc-

tober 1950 Convention held in Chicago, together with interim papers received during the year. . . .

Vol. 43A contains the 12 papers (240 pages) presented at the seminar on "Atom Movements" held on Oct. 21 and 22, 1950 . . . the subject being selected by a committee appointed by the Board of Trustees. . . . (Clarence Zener, chairman).

Publications Committee—Eighteen persons constitute the membership of the Publications Committee for 1951, under the chairmanship of W. A. Pennington. . . .

During the year the Committee has reviewed 66 papers. Of this number 36 were approved for presentation at this convention and publication in *Transactions,* and were prepared in preprint form. Fourteen papers were not approved for publication in *Transactions.* Fourteen papers were not scheduled for this convention but deferred for consideration for the midwinter meeting of the Society to be held in Pittsburgh on Jan. 31 and Feb. 1, 1952. Thirteen papers are now in the process of review.

The Publications Committee held one formal meeting on June 6 and 7, 1951. . . .

Educational Committee—The Educational Committee (Karl L. Fetters, chairman) . . . did not hold a formal meeting during 1951 inasmuch as the educational lecture courses for the 1951 convention were selected and planned by the 1950 committee. These lectures are:

1. Residual Stress Measurements—Four-lecture series by R. G. Treuting, Bell Telephone Laboratories; J. J. Lynch, American Tank & Fabricating Co.; H. B. Wishart, Gary Works, U. S. Steel Co.; D. G. Richards, United Aircraft Corp.

2. Principles of Heat Treatment—Three-lecture series by M. A. Grossmann, U. S. Steel Co.

The color, sound, 16-mm film entitled "The Heat Treatment of Steel" is still in the process of preparation.

Advisory Committee on Metallurgical Education—This committee (M. A. Hunter, chairman) recommended that the Board establish teaching awards for teachers of metallurgy; collect information about summer work from schools and industry and distribute this information; and publish paper-bound editions of technical books at reduced prices for students.

Metal Progress — Editorial pages printed by *Metal Progress* in fiscal 1951 totaled 665½, about 6% more than the average for the preceding three years.

Advertising patronage (1307 pages) showed a gratifying improvement over the preceding year, and this advancing trend seems clearly indicated in the recent month-by-month records. At the start of this fiscal year, Taylor Lyman, who had been associate editor, was transferred to the business side of the magazine, with the title of publisher, and the duty of correlating and promoting the solicitation of advertising. His field staff was also increased to five men.

On the editorial side, John Parina, Jr., was appointed associate editor to fill the vacancy caused by Mr. Lyman's transfer.

The high typographical and pictorial quality constantly maintained by *Metal Progress* was recognized by the "certificate of excellence" awarded last fall by the American Institute of Graphic Arts. . . .

We regret to have to record the untimely death of Adolph Bregman, one of our consulting editors. . . .

Metals Review published a total of 583 pages during the 12 months from Oct. 1950 through Sept. 1951. Of this total, 180 pages, or 31%, were devoted to reports of local chapter meetings, activities of members, and actions of the national organization. The ASM Review of Current Metal Literature accounted for 327 pages, or 56% of the total.

A new service of the American Society for Metals was inaugurated in the February issue. This is a "Junior Members' Placement Service", which listed the qualifications and photographs of some 300 junior members of the ASM who were graduating in February or June. . . . The Board of Trustees has decided to continue this placement service for graduating metallurgists as an annual feature.

Metals Handbook — Although the Metals Handbook Committee has been inactive during the past year, the Society has undertaken other technical committee work relating to the defense production effort, and this activity has been supervised by the Handbook editor. In collaboration with the Metallurgical Advisory Board in Washington, (R. F. Mehl, chairman), the A.S.M. has formed two committees to advise Government agencies on conservation of metal. . . .

Books—During the past year, a total of 21,097 books published by the Society was sold to members and others. This figure includes 1707 copies of the 1948 Metals Handbook.

During this period seven titles were added to the publication list. These are:

Transactions of the ASM, Vol. 43; Atom Movements, Seminar by 13 authors; High-temperature Properties of Metals, by six authors; Interpretation of Tests and Correlation With Service, by six authors; Nature of Metals, Techbook by B. A. Rogers; Review of Metal Literature, Vol. 7; Story of Metals, Techbook by J. W. W. Sullivan.

The following titles are now in preparation:

Cast Bronze, By Harold J. Roast; Revision of Principles of Heat Treatment, by M. A. Grossmann, Elements of Hardenability, by M. A. Grossmann; Proceedings of the 1951 World Metallurgical Congress; Residual Stress Measurements, by four authors; Atmosphere Heat Treatment of Steel, by Floyd E. Harris.

Preprints — Thirty-seven papers were prepared in preprint form and distributed to those members of the Society who requested them. The total number of pages for the 1951 preprints is 679. A total of 45,000 preprint copies was distributed free to the membership.

The papers to be presented at the midwinter meeting are now available as preprints and may be secured by members on request.

The Seminar on Metal Interfaces (J. H. Hollomon, chairman of the committee on arrangements) was an outstanding success. It was divided into four important and interesting sessions with the meeting room filled to capacity. . . .

One of the papers presented on the Seminar, i.e., "Grain Shapes and Other Metallurgical Applications of Topology" by Cyril Stanley Smith, was prepared in preprint form and distributed to those members requesting it.

The Metal Congress, as you may well know, is a meeting of four national technical societies: the American Welding Society, Metals Division of American Institute of Mining and Metallurgical Engineers, Society for Non-Destructive Testing, and the American Society for Metals.

All have prepared and are presenting meeting programs of the highest order. . . .

National Metal Exposition—It has been 13 years since the Metal Exposition has been in Detroit, which is a very good exposition city. There are 402 exhibitors, including 60 from overseas. The exposition is occupying 10 buildings, six and one-half acres.

World Metallurgical Congress — The president has made mention of the World Metallurgical Congress, the treasurer has made mention of the World Metallurgical Congress, so it seems no more than fitting that I should make some mention of it also. I wish, however, to address my remarks not to our overseas conferees, but to the American members of the A.S.M.

You have from the very beginning of the planning through the completion of arrangements for this Congress given it your wholehearted support and cooperation. You have praised its purposes and have acknowledged the helpfulness that could come to all of us through this interchange of ideas and experiences.

It has been the privilege of many of you to receive some of our overseas conferees in your own plants, and to a man they have reported your tremendous cordiality.

The response to the invitation of the Board of Trustees to some 500 members to become American con-

ferees was instantaneous and heart-warming. By your actions here, the A.S.M. members have demonstrated beyond all doubt that they welcome the responsibility as the sole sponsor of this World Metallurgical Congress.

The conferees from abroad will long remember the firm hand of friendship and the warm words of greeting that you ASMers have extended to them, and at the same time I am confident that there will long remain in your minds a feeling of great joy that it was your privilege to play an important part in helping to forge the foundations of lasting friendship among the metal scientists of the free world.

Appointments to A.S.M. Standing Committees

At the meeting of the Board of Trustees of the American Society for Metals held Oct. 31, new appointments to the various national committees of the Society were announced by President Chipman and confirmed by the Board. The complete personnel of the standing committees is listed below. The new appointments are shown in italics and the numerals represent the date of expiration of the appointment.

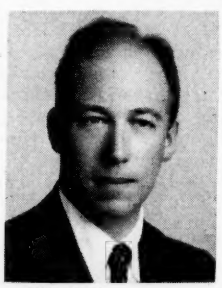
W. M. Baldwin

N. J. Grant

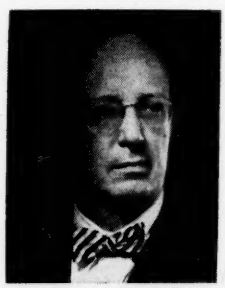
R. M. Brick

H. C. Knerr

F. A. Forward



Alfred Bornemann



E. O. Dixon

These Men Are the Newly Appointed Chairmen of the Following A.S.M. Standing Committees; W. M. Baldwin, Jr., Publications Committee; Nicholas J. Grant, Educational Committee; Robert M. Brick, Seminar Committee; Horace C. Knerr, Vocational Education Committee; F. A. Forward, Constitution and By-Laws Committee; Alfred Bornemann, Advisory Committee on Metallurgical Education; E. O. Dixon, Metals Handbook Committee

Constitution and By-Laws Committee

F. A. Forward, University of British Columbia, Vancouver, B. C., '52, Chairman.
H. E. Flanders, University of Utah, Salt Lake City, '53.
E. J. Hergenroether, International Nickel Co., Detroit, '52.
J. C. Neemes, Jr., International Nickel Co., Minneapolis, Minn., '54.
George A. Roberts, Representative of the A.S.M. Board of Trustees.
Gilbert Schaller, University of Washington, Seattle, Wash., '52.
L. G. Toye, General Electric Co., Erie, Pa., '53.

Finance Committee

R. L. Dowdell, University of Minnesota, Minneapolis, Minn., Chairman (A.S.M. Treasurer).
A. A. Hess, A.S.M., Assistant Treasurer '53.
Benjamin B. Bullwinkle, Turck MacKenzie Co., Portland, Ore., '54.
Zay Jeffries, Pittsfield, Mass., '54.
R. Lynch, Atlantic Steel Co., Atlanta, Ga., '52.
K. R. Van Horn, Aluminum Co. of America, New Kensington, Pa., '52.
H. F. Wood, Wyman Gordon Co., Harvey, Ill., '53.
F. P. Zimmerli, Barnes-Gibson-Raymond, Detroit, '53.

Publications Committee

W. M. Baldwin, Jr., Case Institute of Technology, Cleveland, '52, Chairman.
Ray T. Bayless, A.S.M., '52, Secretary.
William W. Austin, Jr., Southern Research Institute, Birmingham, Ala., '54.
W. E. Bancroft, Pratt & Whitney Div., Niles-Bement-Pond Co., W. Hartford, Conn., '53.
J. A. Bennett, National Bureau of Standards, Washington, D. C., '52.
C. L. Clark, Timken Roller Bearing Co., Canton, Ohio, '53.
Alfred H. Geisler, General Electric Company, Schenectady, N. Y., '54.
Malcolm F. Hawkes, Carnegie Institute of Technology, Pittsburgh, '54.
E. I. Larsen, P. R. Mallory & Co., Inc., Indianapolis, '52.
E. M. Mahla, E. I. du Pont de Nemours Co., Wilmington, Del., '53.
F. T. McGuire, Deere & Co., Moline, Ill., '53.
M. E. Merchant, Cincinnati Milling Machine Co., Cincinnati, '53.
Peter Payson, Crucible Steel Co. of America, Harrison, N. J., '54.
G. C. Riegel, Caterpillar Tractor Co., Peoria, Ill., '52.
C. H. Samans, Standard Oil Co., Chicago, '53.
J. W. Spretnak, Ohio State University, Columbus, Ohio, '54.
L. P. Tarasov, Norton Co., Worcester, Mass., '52.

Educational Committee

N. J. Grant, Massachusetts Institute of Technology, Cambridge, Mass., '52, Chairman.
Ray T. Bayless, A.S.M., Secretary.
M. J. Day, Carnegie-Illinois Steel Corp., Pittsburgh, '52.
G. M. Enos, Purdue University, Lafayette, Ind., '54.
H. Y. Hunsicker, Aluminum Co. of America, Cleveland, '52.
N. C. Jessen, Babcock & Wilcox Co., Barberton, Ohio. '54.
I. R. Kramer, Office of Naval Research, Washington, D. C., '52.
Ray McBrian, Denver and Rio Grande Western Railroad Co., Denver, Colo., '52.
F. G. Tatnall, Baldwin Locomotive Works, Eddystone, Pa., '53.
R. F. Thomson, General Motors Corp., Detroit, '53.

Metal Progress Advisory Committee

E. E. Thum, Editor, *Metal Progress*, Cleveland.
John Chipman, President, A.S.M.
Ralph L. Wilson, Vice-President, A.S.M.
W. H. Eisenman, Secretary, A.S.M.
Ray T. Bayless, Assistant Secretary, A.S.M.
F. S. Badger, Haynes Stellite Co., Kokomo, Indiana, '54.
A. W. Demmler, Campbell, Wyant and Cannon Foundry Co., Muskegon, Mich., '52.

L. S. Fletcher, Sam Tour & Co., New York City, '54.
M. L. Frey, Allis-Chalmers Mfg. Co., Milwaukee, Wisc., '52.
F. G. Norris, Wheeling Steel Corp., Pittsburgh, '53.
Leo Schapiro, Douglas Aircraft Co., Santa Monica, Calif., '54.

Advisory Committee on Metallurgical Education

Alfred Bornemann, Stevens Institute of Technology, Hoboken, N. J., Chairman.
J. B. Austin, U. S. Steel Research Laboratories, Kearney, N. J., (Representative of Board of Trustees)
D. S. Eppelsheimer, Missouri School of Mines, Rolla, Mo., '53.
F. M. Klayer, Tube Turns Inc., Louisville, Ky., '52.
V. N. Krivobok, International Nickel Co., New York City, '52.
Joseph Libsch, Lehigh University, Bethlehem, Pa. '54.
C. K. Lockwood, Shawinigan Chemicals Ltd., Montreal, Quebec, '52.
W. E. Mahin, Armour Research Foundation, Chicago, '54.
John P. Nielsen, New York University, New York City, '54.
W. O. Philbrook, Carnegie Institute of Technology, Pittsburgh, '52.
E. C. Wright, University of Alabama, University, Ala., '53.

Vocational Education Committee

Horace C. Knerr, Metallurgical Laboratories, Inc., Philadelphia, Chairman
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William F. Collins, United Carr Fastener Co., Cambridge, Mass.
Lloyd R. Cooper, Heppenstall Co., Pittsburgh.
Joseph G. Jackson, Wm. Steell Jackson & Son, Philadelphia.
Harry B. Knowlton, International Harvester Co., Chicago.
Robert C. Onan, Lindberg Engineering Co., Milwaukee, Wisc.
Stanley R. Prance, Inland Mfg. Division, General Motors Corp., Dayton, Ohio
William C. Schulte, Curtiss-Wright Corp., Caldwell, N. J.

Seminar Committee

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Harvey Brooks, Harvard University, Cambridge, Mass., '52.
Bruce Chalmers, University of Toronto, Toronto, Canada, '52.
Morris Cohen, Massachusetts Institute of Technology, Cambridge, Mass., '52.
L. K. Jetter, Oak Ridge National Laboratory, Oak Ridge, Tenn., '52.
Oscar Marzke, Naval Research Laboratory, Washington, D. C., '52.
A. D. Schwope, Battelle Memorial Institute, Columbus, Ohio, '52.
E. R. Parker, University of California, Berkeley, Calif., '52.
Frederick Seitz, University of Illinois, Urbana, Ill., '52.
R. Smoluchowski, Carnegie Institute of Technology, Pittsburgh, '52.
David Turnbull, General Electric Co., Research Laboratories, Schenectady, N. Y., '52.

Ten Years Ago

Quotes From *Metals Review*, December 1941

"New Jersey Chapter—A story of hard times ahead for many small non-defense plants and of OPM's efforts to soften the blow while still conserving supplies of vital metal was told by HARVEY A. ANDERSON, chief of Conservation and Substitution Branch of the OPM, at the Nov. 17th meeting. Mr. Anderson was then on leave of absence from his post as materials engineer for Western Electric Co."

Metals Handbook Committee

E. O. Dixon, Ladish Drop Forge Co., Cudahy, Wisc., '52, *Chairman.*
Taylor Lyman, A.S.M., Secretary.
Walter Crafts, Union Carbide & Carbon Research Laboratories, Niagara Falls, N. Y., '52.
O. E. Cullen, Surface Combustion Corp., Toledo, Ohio, '54.
T. E. Eagan, Cooper Bessemer Corp., Grove City, Pa., '54.
B. W. Gonser, Battelle Memorial Institute, Columbus, Ohio, '54.
Max Hansen, Illinois Institute of Technology, Chicago, '54.
Paul Moss, Eaton Manufacturing Co., Saginaw, Mich., '53.
N. E. Promisel, Navy Bureau of Aeronautics, Washington, D. C. '54.
Robert Sergeson, Rotary Electric Steel Co., Detroit, Mich., '54.
R. L. Sweet, Michigan State College, East Lansing, Mich., '53.
R. E. Van Deventer, Packard Motor Car Co., Detroit, '52.
L. H. Winkler, Bethlehem Steel Co., Bethlehem, Pa. '54.

Buffalo Committee Welcomes Officers

With One Exception, the Entire Executive Committee of the Buffalo Chapter Was Photographed at National Officers' and Past Chairmen's Night. Front row, seated, are: Robert E. Harvie, chapter chairman; John Chipman, national president; C. M. Offenhauer, vice-chairman; and W. H. Eisenman, national secretary. Back row: R. Perry, L. Stetson, C. F. Kappelt (chapter treasurer), E. M. Galbreath, (secretary), M. Hayes, R. Griffenhagen, B. Davis, and S. Brown. Missing is S. Urban

Reported by A. E. Leach
Metallurgical Engineer, Bell Aircraft Corp.

More fundamental research is needed to understand the behavior of non-metallic elements in molten iron. This need was expressed by the national president of A.S.M. Prof. John Chipman, in an address delivered to the Buffalo Chapter.

For the occasion of National Officers' and Past Chairmen's Night a record 150 members turned out to hear Dr. Chipman's lecture and a coffee talk by Bill Eisenman, A.S.M. national secretary.

Dr. Chipman chose the subject of desulphurization and showed how past research has increased our understanding of the behavior of this element. His lecture will be presented before a number of A.S.M. chapters during the current season.

Interesting and amusing highlights of the recent visit by foreign metallurgists to the National Metal Congress were told by Bill Eisenman in his coffee talk.

At the conclusion of the meeting, Bert Davis, past chairman of the Buffalo Chapter, was presented a certificate for meritorious service by Walter Esaw, also a past chairman.

January 31 and February 1, 1952

MIDWINTER MEETING

William Penn Hotel—Pittsburgh

Thursday, Jan. 31

9:30 A. M.—Titanium and Titanium Alloys

The Titanium-Vanadium System, by H. K. Adenstedt, J. R. Pequignot and J. M. Raymer, Wright Patterson Air Force Base.

The Systems Titanium-Chromium and Titanium-Iron, by R. J. Van Thyne, H. D. Kessler, and M. Hansen, Armour Research Foundation.

The Scaling of Titanium in Air, by P. H. Morton and W. M. Baldwin, Jr., Case Institute of Technology.

Gamma Loop Studies in the Iron-Titanium, Iron-Chromium and Iron-Titanium-Chromium Systems, by W. P. Roe, National Lead Co. and W. P. Fishel, Vanderbilt University.

2:00 P. M.—Embrittlement

Overcoming Rheotropic Brittleness; Precompression vs. Pretension, by E. J. Ripling and W. M. Baldwin, Jr., Case Institute of Technology.

Temper Embrittlement in Plain Carbon Steels, by J. L. Libsch, Lehigh University and Lepel High Frequency Labs., Inc., A. E. Powers, General Electric Co., and Gopalkrishna Bhat, Lehigh University.

The Rate of Pickling Test for Tin Plate Steels and Its Metallurgical Significance, by E. L. Koehler, Armour Research Foundation.

The Embrittlement of Pure Iron in Wet and Dry Hydrogen, by James K. Stanley, Standard Oil Co.

The Initiation of Plastic Strain in Plain Carbon Steels, by C. S. Roberts, Massachusetts Institute of Technology, R. C. Carruthers, American Brake Shoe Co. and B. L. Averbach, Massachusetts Institute of Technology.

6:00 P. M.—A. S. M. Dinner

8:00 P. M.—High Temperatures and Oxidation

A Recording Dilatometer for High Temperatures, by W. R. Apblett and W. S. Pellini, Naval Research Laboratory.

Accelerated Oxidation of Metals at High Temperatures, by A. Brasunas, Oak Ridge National Laboratory, and N. J. Grant, Massachusetts Institute of Technology.

The Effects of High Temperatures and Oxidation Atmospheres Upon Inconel, by T. E. Piper, Northrop Aircraft, Inc.

Friday, Feb. 1

9:30 A. M.—Nonferrous Alloys

The Fatigue Properties of Some Binary Alpha Solid Solutions of Aluminum, by J. W. Riches, O. D. Sherby and J. E. Dorn, University of California.

The Functions of Alloying Elements in the Creep Resistance of Alpha Solid Solutions of Aluminum, by A. T. Robinson, T. E. Tietz and J. E. Dorn, University of California.

Influence of Grain Size on Work Hardening and Fatigue Characteristics of Alpha Brass, by G. N. Sinclair and W. J. Craig, University of Illinois.

Physical, Thermal and Electrical Properties of Hafnium and High-Purity Zirconium, by H. K. Adenstedt, Wright-Patterson Air Force Base.

2:00 P. M.—Transformations and Grain Growth

An Electrical Resistance Apparatus for Studying Transformations in Metals—Its Application to Transformations in Stainless Steel, by W. H. Colner, Armour Research Foundation, and Otto Zmeskal, Illinois Institute of Technology.

The Solubility of Carbon in Molten Iron and in Iron-Silicon and Iron-Manganese Alloys, by John Chipman, R. M. Alfred, L. W. Gott, R. B. Small, D. M. Wilson, C. N. Thomson, D. L. Guernsey and J. C. Fulton, Massachusetts Institute of Technology.

Grain Growth in High-Purity Iron, by George Wiener, Westinghouse Electric Corp.

Recrystallization and Grain Growth of Nickel, by G. W. Wensch, Fansteel Metallurgical Co., and H. L. Walker, University of Illinois.

MAKE YOUR ROOM RESERVATION
DIRECT TO THE HOTEL, ADDRESSING
WILLIAM PENN HOTEL, PITTSBURGH
and Specifying That You Will Attend the Midwinter Meeting of the American Society for Metals, Jan. 31 and Feb. 1, 1952

Wichita Chapter Meets at Coleman Co. for Plant Inspection

Members of the Wichita Chapter Who Visited the Coleman Co. Plant on Oct. 16

Teaching Awards of $2000 Each Established By A.S.M. Board Action

Awards for the teaching of metallurgy amounting to $2000 apiece have been established by the American Society for Metals, for the purpose of stimulating interest in the teaching profession among younger instructors.

The awards are open to any teacher of metallurgy, metallurgical engineering or the metal sciences in any school in the United States or Canada, who is under 40 years of age on April first of the year during which the award is made. He must have a sound knowledge of and enthusiasm for his subject, and must have demonstrated his ability to impart that knowledge and enthusiasm to his students.

Nominations may be made by individual A.S.M. members, by local chapters, or by alumni groups. Letters of nomination should include the candidate's present position and his preparation and earlier experiences. A detailed statement should be included, supported by evidence from associates and former students, as to (*a*) his accomplishments as a teacher, (*b*) his competence in the field of metallurgy, (*c*) his ability to organize and present a course of instruction in metallurgy, and (*d*) his influence upon students and associates. The teacher's proficiency in research should be considered only insofar as it bears upon his teaching accomplishments.

The award will be made by the Board of Trustees on recommendation of an Award Committee appointed by the president. Nominations must be received at national headquarters of the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio, by April first. The award will be presented to the winners during the A.S.M. annual convention in October.

Chicago Member Dies; Was Active in Chapter

Richard F. Anderson, a longtime member of Chicago Chapter A.S.M. died in Chicago on Nov. 5 after a lingering illness.

Mr. Anderson had been president of the Anderson-Shumaker Co., tool-steel forging specialists, since 1940. He succeeded his father who was one of the company's founders. The Anderson-Shumaker Co. has been a sustaining member of the Chicago Chapter since 1928.

Mr. Anderson served on the Executive Committee of the chapter in 1934-35 and was active in chapter activities until his illness. He was especially energetic in his efforts to provide press coverage of A. S. M. meetings and educational programs. His death is a great loss to his many friends and business associates as well as to the Society.

The Reviewing Stand

A RELATIVE newcomer to National Metal Congress programs is the Metals Section of the Special Libraries Association. That it finds itself right at home in Metal Congress surroundings was amply evident at the Detroit Metal Show and Congress in October. A well-appointed booth at the Exposition, stocked with a representative assortment of metallurgical books and periodicals, both American and foreign, and staffed by competent librarians, did a lively business in assisting the metallurgists present with their literature problems. The Metals Section also sponsored a two-day regional meeting in Detroit, which offered some excellent papers and stimulating discussions.

The papers presented were about equally divided between librarians and metallurgists—that is to say, the librarians explained some of the things they are doing to help the metallurgist find the technical information he wants promptly, completely, and with a negligible expenditure of labor—a large order! The metallurgists on the program, for their part, told the librarians what their needs are and pointed the direction for the most profitable cooperation between metallurgical research and literature searches.

Two papers on the Thursday morning session, with their discussion, constituted something of a progress report on one of the newer devices for literature searching—namely, the manually operated punched card system. Such a system was set up a year and a half ago as a joint project of the A. S. M. and the S. L. A. Metals Section; how it is being successfully utilized in the division of metallurgical research of the Kaiser Aluminum and Chemical Corp. was recounted by Alvina Wassenberg, librarian. A similar scheme has been designed by the National Association of Corrosion Engineers to handle the literature on corrosion, and this was ably explained and demonstrated by Ivy Parker, of Plantation Pipe Line Co., editor of *Corrosion*.

A distinguished visitor at this meeting was Antonio Scortecci, director of Finsider Metallurgical Institute (a holding company controlling about half of Italy's iron and steel industry) and head of the department of metallurgy at University of Genoa. Professor Scortecci is also vice-president of the Italian Metallurgical Association and chairman of its Committee on Bibliography. In the latter capacity he has had a strong hand in the development of a metallurgical literature classification system for use with a machine method of punched card filing and sorting. This project of A. S. M.'s Italian counterpart, the I. A. M., was in its formative stages at the same time as the ASM-SLA system. An interchange of correspondence and reports between the two committees at that time revealed that the Italian and American systems are surprisingly similar in their broader aspects.

A natural assumption arising from this similarity is that here is the ideal basis for an internationally standardized system, and Professor Scortecci's purpose in attending the S.L.A. meeting was to enter a plea for such collaboration. The ASM-SLA scheme, he feels, appears to offer the most promise as a basis upon which to build an improved classification that would be satisfactory to Americans, Italians, French, British, Germans and other nationalities alike.

The suggestion is a challenge, for the obstacles are large. First, there is the language barrier—the cost of technical translation being what it is. Geographical and industrial differences, nation to nation, would lead to conflicts of opinion regarding shades of emphasis on various aspects of metallurgical science. And such conflicts are not easy to resolve by correspondence (although hints of another World Metallurgical Congress soon to come offer possibilities of at least one meeting ground).

The largest stumbling block of all is probably inherent in the punched-card systems themselves. At present two general systems are in use—the manually sorted (needle-operated) type such as the ASM-SLA system, and the machine-operated (IBM or Remington-Rand) type. The first is limited in size—a maximum of 10,000 literature references before the sorting operation bogs down); it is primarily useful to the individual in the research laboratory. The second relies upon expensive and complicated equipment, available only to large organizations.

Any classification method adopted internationally must be able to handle both the large library collection and the smaller file of the research worker. While it may not be impossible to devise a classification scheme that would serve both purposes, a happier compromise might be effected by using a hand-punched card and inventing a simple mechanical method for rapid sorting.

M.R.H.

Decries Lack of Metallurgical Data on Spring Materials, Manufacture, Troubles

Reported by T. J. Phillips
Metallurgist, Alloy Steels, Inc.

F. P. Zimmerli, chief engineer, Barnes-Gibson-Raymond Division, Associated Spring Corp., became the ninth Woodside Memorial lecturer honoring William Park Woodside, A.S.M. founder member, when he addressed a capacity audience of the Detroit Chapter on Oct. 8. Mr. Zimmerli's subject was "Metallurgy in the Mechanical Spring Industry".

Despite wide usage, there seems to be less available information among metallurgists regarding spring materials, metallurgical methods employed in spring manufacture and causes of trouble in springs than on any other article nearly as useful, the speaker said in his introduction.

Mr. Zimmerli defined mechanical springs as springs of any material, formed to any shape at room temperature, with or without subsequent heat treatment. They may be ⅛ in. or less thick in flat sections and ½ in. diameter or less in wire.

A steel containing 0.60 to 0.90% carbon and a similar percentage of manganese accounts for about 90% of spring materials, the remaining 10% being alloy steels and nonferrous metals.

Flat springs are made from oil tempered S.A.E. 1095, 1074, and 1064. S.A.E. 6150 and 9260 steels are used when heat resistance is required and higher stress is present. S.A.E. 950 steel of around 0.13% mean carbon content has been used successfully when carburized and diffused to an average carbon of 0.45%. This material can be more drastically cold formed and hence offers the possibility of more intricate shapes. Stainless steel of the 18-8 type is also employed in flat springs.

Rigid A.S.T.M. specifications control the manufacture of round wire for mechanical springs. Compositions include S.A.E. 1065, 6150, 9254, 9260; 18-4-1 and M-2 type high speed steels; Type 302, 316, 17-7 P.H. and stainless W. Copper alloys include: brass, Grade A and Grade C phosphor bronze and beryllium-copper. Nickel alloys are monel, "K" monel, Inconel, Inconel "X", Duranickel, Elinvar, and Ni-Span-C. Elgiloy, patented by the Elgin Watch Co., is a high cobalt, Cr-Ni-Mo composition which is nonmagnetic and highly corrosion resistant. It has excellent qualities for watch springs. For special application glass, quartz, plastics, and even wood have become spring materials.

Steel springs may be heat treated by three methods—ordinary oil quench and draw, austempering, and martempering—each method having specific purposes. Austempered springs do not have the stress range of springs made by either of the other methods. A martempered spring and one given a quench and draw have the same stress range within the accuracy of the testing machine. A martempered spring goes out of shape less in heat treatment than one treated by quench and draw, and an austempered spring changes still less. The reduction of area (or ductility) for an austempered or a martempered piece is greater than that of a quenched and drawn spring.

O. W. McMullan (Left) Presents the William Park Woodside Certificate to F. P. Zimmerli, Chief Engineer, Barnes - Gibson - Raymond Division, Who Presented the Annual Woodside Lecture of the Detroit Chapter on Metallurgy of Mechanical Springs

An important heat treating method designed to maintain dimensions despite shape changes in quenching is called setting. This process puts spring steels of high hardness under simultaneous heat and pressure while held to the desired shape in a die or fixture.

Shot peening is one of the most important of all metallurgical developments, Mr. Zimmerli said, its purpose being to improve the fatigue properties of the part. Shot peening, since it is a mechanical working process, can be affected by heat. If springs are heated sufficiently after shot blasting, the benefits will be removed and the endurance limit will drop to that of the wire originally received. If the springs are heated still higher, then this original limit will be altered.

Referring to spring failure, Mr. Zimmerli explained that more springs are broken by engineering design than by all other causes.

A. DiGiulio, consulting engineer, served as technical chairman and conducted a lively discussion period following Mr. Zimmerli's talk.

A number of European visitors in Detroit for the subsequent World Metallurgical Congress attended the meeting and dinner.

Predicts Two Classes of Boron Steel Will Replace 70% of Constructional Steel

Reported by Lacy M. Smith
Eastman Kodak Co.

Two classes of boron steels will replace 70 to 80% of the present constructional alloy steels on a hardenability basis, it was predicted before the October meeting of the Rochester Chapter A.S.M. The speaker was G. D. Rahrer, specifications engineer, United States Steel Co., Pittsburgh, and his subject "The Properties of Boron Steels".

His address covered the manufacture, fabrication and analyses produced, and their interchangeability with alloy steels used in the past. The two principal new series of boron steels are known as 80BXX and 81BXX; they have been developed to replace 86XX or 87XX and 41XX respectively. A recently added series is the 50BXX, alternates to the 51XX steels.

Boron is being used successfully in carburizing grades to replace regular alloy steels. In this connection boron is more effective when the maximum carbon content of the case is about 90% and the quench temperature is just above the upper critical. Content of conventional alloys must be adequate to avoid low surface hardness or soft spots.

At the present time boron steels account for 7% of the total tonnage in the low-alloy field. They are being used primarily for large production runs where advantage is taken of their improved hot and cold working, shorter annealing cycles, and good machinability. Generally speaking, substitutions of boron steels for those used in the past are based on hardenability.

Mr. Rahrer feels that boron steels will continue to gain in popularity and that demand for them will remain when the present emergency is over, just as happened with the 86XX and 87XX steels when World War II ended.

See Movies of McNary Dam

Reported by B. R. Elder
Metallurgist, General Electric Co.

The Columbia Basin Chapter A.S.M. held a dinner meeting at the Desert Inn Hotel, Richland, Wash., on Oct. 29. During a short business meeting, G. L. Flint reported on the National Metal Congress and Exposition.

The major portion of the meeting was devoted to viewing films of the construction of McNary Dam, the third giant dam to be placed in the Columbia River. A. Ross of the U. S. Army Corps of Engineers presented the films and answered questions in an ensuing discussion period.

Grossmann Explains How Boron Affects Steel Hardenability

Reported by John L. Morosini
D. A. Stuart Oil Co.

The use of boron in steel—and knowledge of its effect—have been developed largely within the past ten years, the Boston Chapter learned at its first meeting of the season on Oct. 5. The speaker was Marcus A. Grossmann, director of research, United States Steel Co.

Commercial application began about 1940, and up to 1951 an average of less than 40,000 tons of boron steel was made annually; yet production of even this small amount saved many tons of metallic alloys annually, principally nickel.

Additions of less than 0.001% of boron to steel have a marked and measurable influence on hardenability, the speaker explained.

As regards quantitative effects, the increase in hardenability that results from addition of boron decreases with increasing carbon content of the steel. The multiplying factors are the same whether 50% or 90% martensite is taken as the criterion of hardenability.

It is useful to think of hardening as something that takes place autoed with grain boundaries. Boron steels tend to be slightly coarser in grain size than similar steels free of boron, and coarsening is also a grain-boundary mechanism. This tendency can be counteracted by a judicious increase in the aluminum addition used for grain size control.

The hardenability effect of boron is maximum in the normal hardening range (say, 1500 to 1600° F.) and becomes less if the austenitizing temperature is raised substantially, approaching zero at about 2000° F. The hardenabiilty effect can be restored if boron steels originally heated to too high a temperature are reheated at lower temperatures (1400 to 1600° F.) or are cooled to a lower temperature prior to quenching. Heating for very long times at very high temperatures, for example, 100 hr. at 2350° F., will destroy the boron effect and it cannot then be restored. However, this loss does not occur with normal heating practices used for rolling or forging.

To obtain the maximum hardenability effect of boron, steels must be well deoxidized, and their nitrogen content neutralized or, possibly, kept low in the first place.

About 200 attended the lecture, which was preceded by an interesting talk by John F. Shea, assistant director, Division of Vocational Education of the Commonwealth of Massachusetts. Morris Cohen of Massachusetts Institute of Technology acted as technical chairman.

At Boston Chapter's October Meeting Are Dow Robinson, Chapter Chairman; Marcus A. Grossmann, Speaker; John Chipman, National President and Member of the Chapter; and Morris Cohen, Technical Chairman (Photograph by H. L. Phillips)

matically if it is not defeated by transformation of some austenite to pearlite or upper bainite around 900 to 1100° F. during cooling. A hardenability agent, then, may be considered to increase hardenability by decreasing the tendency for pearlite and upper bainite to form.

There is good evidence that boron influences nucleation of fine pearlite and possibly upper bainite. This effect appears to be somehow associat-

Twenty Years Ago
Quotes From Metals Review
December 1931

"York Chapter is sponsoring a course in the heat treatment and metallography of steel which includes 17 weekly lectures. . . ARTHUR W. F. GREEN, metallurgist of American Chain Co., will conduct the course." [Now chief metallurgist, Allison Division, General Motors Corp.]

THIRTY YEARS AGO

Quoting from the March 1921 issue of the A.S.S.T. (now A.S.M.) *Transactions*: "The first chapter of the American Society for Steel Treating to be organized by others than the national office [i.e., without benefit of W. H. Eisenman as midwife] was instituted in Charleston, W. Va. H. SCHAGRIN, chief chemist of the U. S. Naval Ordnance Plant (now living in Chicago and no longer in the metallurgical industry), was elected chairman, and W. I. MCINERNEY, then foreman of heat treating at the armor plant of the U. S. Navy (now superintendent, heat treating and cold drawing departments, Pittsburgh Crucible Division of Crucible Steel Co. of America), was secretary-treasurer.

— 30 —

By way of recompense, according to Mr. McInerney, the national office paid the way of three of the members to attend the third annual convention and exposition in Indianapolis that September.

— 30 —

The Charleston Chapter, however, was short-lived. Based on the wartime activities of the Naval Armor Plant, it expired about the middle of 1922 when the plant was disbanded.

— 30 —

HOWARD SCOTT, then assistant physicist, U. S. Bureau of Standards, now manager, metallurgical and ceramics department, research laboratory, Westinghouse Electric Corp., was author of a paper in the September 1921 *Transactions* entitled "Thermal and Physical Changes Accompanying the Heating of Hardened Carbon Steels".

— 30 —

Establishment of a "night school devoted to heat treatment and metallography" by the Philadelphia Chapter at Temple University is announced in the November 1921 issue. This Temple course, now in its 31st year, has turned out more than 3000 students and has proven to be one of the most successful of chapter educational activities.

— 30 —

The Temple Course was established and carried on for many years under the direction of HORACE C. KNERR of Metlab, Inc., now chairman of the A.S.M. Vocational Education Committee (see page 9).

— 30 —

Properties of a new series of "flame, acid and rust resisting steels" are described by CHARLES M. JOHNSON, director of research department, Crucible Steel Co. of America. Compositions are not given, but it might be a safe bet that they played a part in the development of the "Rezistals".

Movie Illustrates Modern Commercial Foundry Operations

Reported by J. M. Copeland
I. B. M. Corp.

The diversified operations of a medium-sized modern commercial jobbing foundry were pictured by R. C. S. Potter, vice-president and general manager of the Chemung Foundry Corp. on Sept. 17 at Elmira, N. Y. Speaking before the Southern Tier Chapter A.S.M. at the beginning of the Chapter's 25th Anniversary year, Mr. Potter used a 50-min. motion picture produced at the corporation to describe the operations of the Chemung Foundry.

This foundry produces sand castings of gray iron, brass and aluminum ranging in weight from 1 oz. to 5 tons. Gray iron activities involve the scheduling and pouring of from 30 to 50 tons total melt per day from a single cupola.

One of the problems peculiar to this type of commercial foundry as compared to a captive foundry is the need for maintaining thousands of patterns in active storage available for immediate use.

Core-making and molding operations follow the latest machine methods generally, with some bench or hand operations. Machine methods enable one molder in a modern foundry to replace approximately 10 craftsmen using hand methods. The molding sand contains clay, and is generally a mixture of new and old sand which is mulled before using. Core sand is a straight silica sand mixed with a linseed oil binder. The chemical range for gray iron castings is: silicon 1.00 to 2.75%, magnesium 0.50 to 0.70%, phosphorus approximately 0.25%, total carbon 3.25 to 3.50%, and sulphur 0.10% max.

This iron is produced in a cupola using by-product coke as the melting agent. The molten metal, after the cupola is tapped, runs into a mixing ladle from which it is distributed to various pouring operations by overhead cranes. The average pouring temperature ranges from 2700° to 2900° F. Hand pouring is practically eliminated except on rare occasions. Various alloys may be added to the mixing ladle to increase strength or wear resistance.

The Chemung Foundry operates around the clock. The first shift makes the molds and the cores, and cleans the castings. The second shift pours the iron, shakes out the light castings and reconditions the sand. The third shift handles the heavier type castings which require longer cooling rates. This work is done entirely by overhead cranes with the use of a large, portable shakeout machine. The castings, after the removal of gates and risers, are sandblasted, ground and inspected. The laboratory facilities consist of equipment for determining the chemical and microscopic analysis of the iron, tensile strength and machinability, also sand permability, moisture, etc.

Many tons of material are handled to produce one ton of castings. Consequently, a foundry of this type has to employ various means of weight-carrying transportation, such as overhead cranes, hoists, power shovels, bulldozers, electric trucks, roller conveyors, and gas-powered wheelbarrows.

Control of material is, in Mr. Potter's opinion, the most important factor in modern foundry practice.

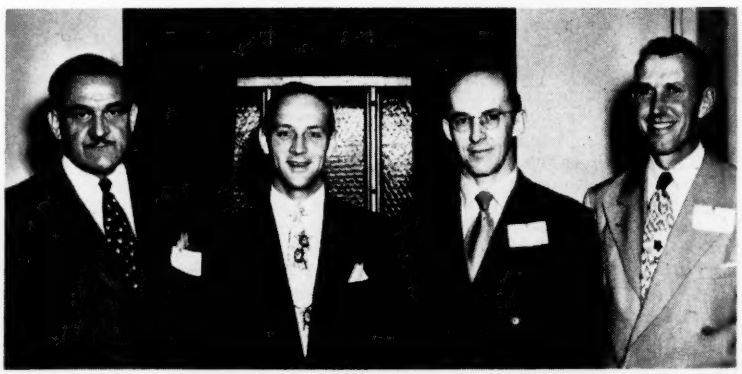
Lecture Series on Inspection

The 1952 Educational Series of the Northwest Chapter A.S.M. will consist of six lectures on "Inspection and Testing of Metals."

The first meeting will be held on Thursday, Jan. 31, 1952, and the following meetings will be held on subsequent Thursdays.

Lecturers include H. S. Jerabek, associate professor of metallography, and B. J. Lazan, professor of mathematics and mechanics, University of Minnesota; Ralph Brown, assistant chief inspector, Arnie Bowers, metallurgical laboratories, and R. H. Lundquist, supervisor of metallurgical department, Minneapolis-Moline Co.

Porter Wray Speaks in Milwaukee



At Milwaukee Chapter Opening Meeting: Ernest G. Guenther, Secretary-Treasurer; John M. Beyerstedt, Vice-Chairman; Porter R. Wray, Speaker; and G. B. Kiner, Chapter Chairman. (Photograph by Mark Wallesz)

Reported by Donald R. Mathews
Allen-Bradley Co.

Milwaukee Chapter A.S.M. started the season in its new meeting place at the Wisconsin Hotel with record dinner and meeting attendances of 156 and 220 respectively. The coffee talk feature was a color movie entitled "Lake Superior Adventure", sponsored by the Evinrude Motors Division of Outboard Marine & Mfg. Co. It portrayed fishing and hunting along the north shores of Lake Superior.

The technical talk on "The Role of Boron Steels in the Present Emergency" was given by Porter R. Wray, metallurgical engineer, United States Steel Co. Details of his address are reported on page 16.

Fluxes and Tolerances Important in Brazing

Reported by W. C. Wheadon
Director, Institute of Industrial Research
Syracuse University

Proper choice and use of fluxes in brazing, as well as the importance of proper tolerance relationships were emphasized by A. F. Holden, president, A. F. Holden Co., addressing the Syracuse Chapter A.S.M. on Oct. 2, at the Onondaga Hotel.

Moisture content of fluxes is a critical factor in good brazing, the speaker asserted. Approximately 36% seems to be optimum, especially in fluxes for copper, brass and bronze. The homogeneity of the flux, its coating and wetting ability will greatly influence the bonding of the two metals.

Salt baths offer considerable versatility in brazing operations, Mr. Holden continued. The bath serves to support the joint and the brazing strip, as well as protect from excessive oxidation and other side-effects.

Mr. Holden discussed at length the specific problems involved in brazing silver, brass, bronze and copper and suggested means for minimizing or eliminating them.

Tolerance relationship is usually given too little attention. Poor joints will result in spite of correct techniques and the best materials, if the tolerances are not correct for the particular brazing operation.

The meeting closed with many questions from the floor, all of which were answered expertly.

Quality of Stainless Welds Related to Soundness and Weld Metal Composition

Reported by Wells E. Ellis
Research Metallurgist
Timken Steel and Tube Division

In the welding of stainless steels, the concept of soundness is an important factor, directly related to the mechanical properties of the weldment. Soundness means freedom from inclusions, porosity and cracking, according to N. C. Jessen of Babcock & Wilcox Co. Mr. Jessen discussed the welding of the austenitic grades of stainless at the first meeting of the 1951-52 season for the Canton-Massillon Chapter A.S.M. Type and design of the weld are determined by the expected service conditions, he said.

A majority of the welding is done using the shielded metal-arc process with coated electrodes. Three types of electrodes are used, namely, the lime-type and the lime-titania type, d.c. reversed-polarity all-position electrodes, and the a.c.-d.c. type electrodes. The straight lime-type electrodes produce the best quality welds. The titania-type electrodes operate and handle more easily although control of quality is more difficult. The type of electrode to be used thus depends upon the service conditions of the weldment.

Welding can be greatly simplified by classifying the various austenitic grades of stainless steels into three groups: (*a*) the 25-20 Cr-Ni type, (*b*) the 15-35 Cr-Ni types, and (*c*) the 18-8 types with columbium, titanium and molybdenum.

Weld quality in the 25-20 types is found to be directly related to the carbon and silicon contents. Carbon above 0.12% and silicon below 0.50% in the deposited weld metal are desirable limits for trouble-free welds.

The 15-35 types are limited to a minimum carbon content of 0.22% and a maximum silicon of 0.35% for best quality welds.

Most of the welding in stainless steels is done with the 18-8 types. Optimum properties are produced when the weld metal composition is slightly unbalanced so that 6 to 8% delta ferrite is present in the microstructure. The problem of crater cracking in the 18-8 columbium types is attributed to a hot-short condition associated with a columbium carbide eutectic in the microstructure. Heat treating conditions for stainless welds are usually designed to limit the formation of sigma phase to a minimum.

In general, the welding of stainless steels differs from welding plain carbon steels in that more precise conditions are necessary. Emphasis was placed on weld metal composition and the importance of design in controlling weld metal quality.

Chipman Speaks on Sulphur Removal

Reported by W. W. Brown
Assistant Chief Metallurgist
Homestead District Works
United States Steel Co.

Pittsburgh Chapter's National Officers' Night, celebrated on Nov. 8, was marked by the presence of John Chipman, president of A.S.M. and professor of metallurgy at Massachusetts Institute of Technology, and W. H. Eisenman, national secretary.

Mr. Eisenman closed the dinner session preceding the formal meeting with his impressions of the World Metallurgical Congress and a summary of the functions of the National Chapter. His plea for all chapters to engage in a campaign to sell engineering, and especially metallurgical engineering, to high school students was well received, since the shortage of engineers is more acute now than ever before.

Dr. Chipman's address at the formal meeting following the dinner session was entitled "The Chemical Behavior of Sulphur in Iron and Steelmaking Processes". It concerned new studies of the fundamentals of sulphur removal from iron and steel.

President Chipman Is Congratulated at the Conclusion of His Talk at the Pittsburgh Meeting by Harold B. Emerick, Assistant to Vice-President, Technology, Jones & Laughlin Steel Corp., Technical Chairman

Technical Papers Invited

The Publications Committee of the A.S.M. will now receive technical papers for consideration for publication in the 1953 *Transactions*. A cordial invitation is extended to all members and nonmembers of the A.S.M. to submit technical papers to the society.

Many of the papers approved by the committee will be scheduled for presentation on the technical program of the 34th National Metal Congress and Exposition to be held in Philadelphia, Oct. 20 to 24, 1952. Papers that are selected for presentation will be preprinted and manuscripts should be received at A.S.M. headquarters office not later than April 10, 1952.

Manuscripts in triplicate, plus one set of unmounted photographs and original tracings, should be sent to the attention of Ray T. Bayless, assistant secretary, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Headquarters should be notified of your intention to submit a paper, and helpful suggestions for the preparation of technical papers will be sent.

Educational Lectures Are Followed by Plant Trips

Reported by George B. Reisenberg
Metallurgist, Armco Steel Corp.

Cincinnati Chapter A.S.M. is sponsoring a series of free educational meetings for members and nonmembers on the "Production of Iron and Steel". Top men were secured to give the story of the process in two lectures, each followed up with an inspection trip a week later. In this manner the member could see at first hand the operations related by the speaker the previous week.

The first meeting on "Production of Iron" by John Poast, blast furnace superintendent of Armco Steel Corp., was well attended. The following week an overflowing crowd made the trip to the Hamilton Plant of Armco to see the actual operation of the coke ovens and blast furnaces.

The lecture on "Production of Steel" was given on Nov. 29 by Richard Thornberry, openhearth superintendent of the Newport Steel Corp. The following week the Newport plant played host to show the openhearths in operation.

The chapter's spring educational program will be announced at a later date.

Library Gets Book Donation

Several rare books by a Scottish author of the last century have been donated to the A.S.M. library by Myron Weiss of New York City. The author is Samuel Smiles, who died in London in 1904; the titles are "Life of George Stephenson", "Story of the Life of George Stephenson", "Self-Help", "Duty", and "Character".

Boron Steels Seen As Replacements for Standard Structurals

Reported by Lester F. Spencer
Chief Metallurgist, Landers, Frary & Clark

The large attendance of 150 members and guests at the initial fall meeting of the Hartford Chapter A.S.M. was evidence of the interest shown in the subject matter, "The Role of Boron Steels in the Present Emergency" given by Porter R. Wray, metallurgical engineer in charge of alloy steels, United States Steel Co. W. P. Eddy, Jr., chief of engineering operations, Pratt & Whitney Aircraft Div., served as technical chairman.

The talk was confined to structural steel compositions used at normal temperatures. Comparisons were made between standard compositions and the new series of lean alloy steels containing boron. The speaker illustrated the potent effect of as little as 0.001% boron on both hardenability and maintenance of high mechanical properties. Thus the 80Bxx boron steels will match the hardenability of the NE 86xx-87xx series and the 81Bxx will match the 41xx. In addition, the 80Bxx and 81Bxx will replace about half of the critical alloy content of the 8600 and 8700 series. The boron compositions 94B17 and 94B20 show promise for carburized parts formerly made of 4620; the 43B17 and 94B20 show promise for carburized parts of heavy duty trucks; 86B45 is a possible replacement for 4340; and 50Bxx is replacing 36xx for some tractor applications.

Additional advantages of boron steels are (*a*) improved hot and cold working, (*b*) shorter annealing cycle, (*c*) improved machinability, all of which should result in economies. Factors which must be considered in the selection and treatment of the boron steels are as follows:

1. Hardenability must be adequate, so that a tempered martensite structure is obtained at the location where the highest stresses are encountered. If other structures are obtained in heat treatment, mechanical properties, particularly toughness, may be impaired to an even greater extent than in the conventional alloy steels.

2. Boron exerts a pronounced effect on the hardening properties, but little or no effect in retarding softness at elevated temperatures. This usually necessitates a lowering of the tempering temperature to attain a desired hardness or strength.

3. Boron cannot perform the same function as does molybdenum, vanadium or tungsten in contributing strength at elevated temperatures. Consequently, any attempt to replace steels high in these elements with boron steels for high-temperature service is not considered practical.

4. Because of the decreasing hardenability effect of boron with increasing carbon content, the hardenability of the case of a carburized part may be insufficient, possibly necessitating a slightly higher alloy and lower carbon content. Some improvement can be effected by limiting the maximum carbon in the cases to about 0.90% carbon.

5. Carburizing, followed by direct quenching, may decrease the hardenability of the core. Either delayed quenching or double treatment seems to be an effective remedy.

White Relates Progress in High-Temperature Metals

Reported by H. A. Ball
Western Brass Mills

Three organizations participated in a joint meeting in St. Louis on Nov. 1 to hear an A.S.M. past president and charter member speak on "High-Temperature Metals". The speaker was Albert E. White, director of the Engineering Research Institute at the University of Michigan. The organizations were the St. Louis Chapter of A.S.M., the Engineers Club of St. Louis, and the American Society for Testing Materials.

Dr. White related the progress in power plant designs and some of the exacting demands made on present condenser tube installations. Problems of welding to withstand both high temperatures and pressures were discussed, and present-day problems explained with the use of photomicrographs and slides. Dr. White also pointed out some applications of alloy steels and their contribution to high-temperature problems.

Following the meeting refreshments were served by the Engineers Club of St. Louis.

President, Secretary Honor New York's Officers' Night

Reported by Neal M. Russell
Sales Representative Vanadium-Alloys Steel Co.

National President John Chipman and National Secretary Bill Eisenman were the special guests of the New York Chapter A.S.M. at the annual National Officers' Night on Nov. 5. Secretary Eisenman briefed the chapter on the recent transactions of the Board of Trustees and reported on the state of the Society as regards membership, finances and activities.

In the address of the evening, Dr. Chipman spoke on "Meeting the Country's Need for Metallurgists". This subject gave him an excellent opportunity to spotlight the educational nature of the society's plans for the coming year. These plans are expected to be an incentive for students to enter the field, as well as for other organizations and interested groups to work toward alleviating the alarming shortage of engineers in metallurgy.

A lively discussion followed the lecture, led by Ulric Jaeger, chairman of the New York Chapter.

Handy Given Honorary Post

Howard E. Handy, metallurgical engineer, Saco-Lowell Shops, Biddeford, Maine, and for the past 26 years secretary-treasurer of the Boston Chapter A. S.M., was nominated last spring as secretary-treasurer emeritus of the chapter. Mr. Handy was an early member of the Detroit and Chicago Chapters, was a charter member of the Washington Chapter, and in 1923 was elected chairman of the Boston Chapter. He will continue as a member of the Executive Committee of the Boston Chapter, acting in an advisory capacity.

Republic Steel Speaker at Texas

A. G. Forrest (Second From Left), Chief Metallurgist, Chicago District, Republic Steel Corp., Was the Speaker at the October Meeting of the Texas Chapter on "New Alloy Steel Compositions." Shown are M. W. Phair of Tennessee Coal, Iron & Railroad Co., vice-chairman; Mr. Forrest; H. C. Dill, Dickson Gun Plant, chairman; and Roy D. Allen, assistant chief metallurgist, Chicago District of Republic. (Photo by L. V. Dolan)

Compliments

To H. L. MAXWELL, supervisor of mechanical engineering consultants, E. I. du Pont de Nemours & Co., Inc., on his election by the American Society for Testing Materials to fill the vacancy of vice-president.

♦ ♦ ♦

To W. H. BRUCKNER, research associate professor of metallurgical engineering, University of Illinois, on the receipt of the 1951 Lincoln Gold Medal of the American Welding Society, for the paper judged to be the greatest contribution to the advancement and use of welding for the year.

♦ ♦ ♦

To ERNEST F. NIPPES and JOHN N. RAMSEY of Rensselaer Polytechnic Institute, for the first prize for a paper from a university source presented by the American Welding Society to winners of the 1951 Resistance Welder Manufacturers Association. Also to Dr. NIPPES, with co-authors J. M. GERKEN and J. G. MACIORA for the second prize in the same category.

♦ ♦ ♦

To ERIC R. SEABLOOM, supervisor of field engineering, Crane Co., on his election as second vice-president of the American Welding Society; to T. B. JEFFERSON, editor of *Welding Engineer* and the Welding Encyclopedia, on election as vice-president of the midwestern district; to ALEXCI P. MARADUDIN, metallurgist and materials engineer, Standard Oil Co. of California, on election as vice-president, western district; to I. O. OEHLER, director of metallurgy and research, American Welding & Manufacturing Co., and to ROBERT S. GREEN, associate professor and chairman of the department of welding engineering at Ohio State University, on their election as directors of A.W.S.

♦ ♦ ♦

To E. L. ROTH of Motor Castings Co., West Allis, Wis., on his election as president of the Gray Iron Founders' Society.

Ten Years Ago

Quotes From Metals Review
December 1941

"A.S.M. War Products Advisory Committees are being formed by many chapters all over the country . . . to be of every possible service to firms manufacturing war materials in the community in which the chapter is located . . . Up to time of going to press, the Baltimore, Boston, Canton-Massillon, Cincinnati, Cleveland, Columbus, Dayton, Detroit, Hartford, Milwaukee, New Haven, New Jersey, New York, Oregon, Peoria, Rhode Island, St. Louis and Toledo Chapters have notified President STOUGHTON that they have appointed committees to study the local situation."

Expansion of Canadian Stainless Industry Shown

Reported by A. F. Mohri
Chief Metallurgist
Steel Co. of Canada, Limited

A talk by John L. Cotsworth, sales manager for stainless steels of Atlas Steels Limited, before the Ontario Chapter A.S.M. on Nov. 2, was confined to the more nontechnical aspects of the corrosion and heat resisting steels. The discussion involved generally the growth of Atlas as a typical expanding Canadian industry and applications of the different types of steels in particular.

Properties and limitations of several types of stainless, with emphasis on the need for standardization with regard to simplification and alloy conservation, constituted the first part of the talk. The final result of standardization would, of course, be a simplification from the consumer point of view, and most important, a general reduction in cost both to the producer and the consumer.

Mr. Cotsworth touched briefly on the merits of stainless steel, emphasizing its great durability and versatility. Production of stainless in Canada has increased by 300% over the past two years. Applications are in such industries as pulp and paper, chemical, flatware, aircraft, food processing, and automotive—to mention a few.

The second section of Mr. Cotsworth's talk consisted of a series of slides illustrating the various types of corrosion in stainless steels, such as pitting, concentration-cell, intercrystalline, stress, cavitation and crevice corrosion. He also showed graphs of chromium content, and discussed generally the increase in corrosion resistance with increase in chromium.

In conclusion, a large number of applications were shown on slides, followed by a short question period.

Washington Has Officers' Night; Entertains Conferees

Reported by Frederick P. Upton
Washington Technical Services

Washington Chapter A.S.M was host to foreign conferees visiting the World Metallurgical Congress who were in Washington on Sept. 21. This was also National Officers' Night for the chapter.

Preceding the technical talk, National Secretary Bill Eisenman gave out some vital statistics of the A.S.M., as well as of his bull farm in Ohio. President-Elect John Chipman gave an interesting talk on "The Chemistry of Molten Steel."

After the technical session the members and guests adjourned to the Pell Mell Room of the Raleigh Hotel for refreshments and interchange of ideas.

Army Certificate Of Appreciation Presented to Jones

The Army Certificate of Appreciation has been presented to Charles B. Jones, professor of physical metallurgy at Pratt Institute, by Lieut. Gen. W. D. Crittenberger at the 1st Army Headquarters in New York.

The award is for service rendered by Mr. Jones to the Office of the Surgeon General as a member of the Medical Group, Technical Industrial Intelligence Committee, in Europe during World War II. His assignment was to investigate the German surgical instrument industry and their use of stainless steels and other corrosion resistant alloys.

Charles B. Jones (Center) Receives the Congratulations of Charles Pratt (Right), President of Pratt Institute, and of Lieut. Col. Lee on the Army Certificate of Appreciation for War Intelligence Service

Mr. Jones has been on the faculty of Pratt Institute for the past 32 years, and a member of the New York Chapter A.S.M. for more than 28 years. At the present time he is serving as chairman of the Educational Opportunities Series of Lectures.

Twenty Years Ago

Quotes From Metals Review
December 1931

"A testimonial dinner to HARRY D. MCKINNEY, vice-president of Driver-Harris Co., who was nominated for director of the Society at the Boston Convention, was tendered him at the Greenbrook Country Club on Oct. 28 by his friends."

♦ ♦ ♦

"The newly authorized Baltimore Group of the Society held its first meeting at the Hotel Emerson on the evening of Oct. 30. The meeting was . . . arranged by the temporary committee of which EMIL GATHMANN† was the chairman."

†Deceased.

Worcester Has Plant Inspection

James M. Shute, Personnel Director, Bachmann Uxbridge Worsted Co., Spoke on the History of the Company at a Meeting of the Worcester Chapter on Oct. 10, Following an Afternoon Inspection of the Plant, and Dinner at the Uxbridge Inn. In the picture are Lincoln G. Shaw of Pratt & Inman, chapter secretary-treasurer; J. Walter Gulliksen, of Worcester Pressed Steel Co., chairman; Mr. Shute; and Wendell J. Johnson of Massachusetts Steel Treating Corp., program chairman. (Reported by C. Weston Russell, Wyman Gordon Co.)

Cobalt and Nickel-Base Alloys Listed for Wear, Corrosion and High Heat

Reported by Paul Maynard
Engineering Laboratory
North American Aviation, Inc.

The first fall meeting of the Columbus Chapter A.S.M. more resembled an international chapter than a local one. This was occasioned by a visiting World Metallurgical Congress Study Tour Group. Among the group was Dr. Borge Lunn, president of the Danish Society for Metals. Also represented were Sweden, Italy, France, Norway and England.

In the after-dinner coffee session, Alex Taylor, former personal photographer to Lord Louis Mountbatten, presented an interesting film on life and customs in Burma.

Fred C. Kroft, superintendent, inspection and process control, Haynes Stellite Co., delivered the technical talk on "The Development and Use of Haynes Cobalt and Nickel-Base Alloys". These alloys were divided into three groups: (*a*) wear resistant and cutting tool alloys, (*b*) corrosion resistant alloys, and (*c*) high-temperature alloys.

The wear resistant and metal cutting tool materials are cobalt-base alloys and derive their desirable characteristics from chemical composition rather than heat treatment. The requirements of a good cutting tool alloy are high hot hardness, low coefficient of friction and ability to take a high polish. This basic group may be used either as a solid bar or as an overlay applied by fusion welding. Some applications are agricultural tools, aircraft valves and valve seats, trimming dies and dimensional inspection gages.

Nickel-base alloys are used for corrosion resistance. Haynes alloys B, C and D are used where the corrosive condition warrants the additional cost. Alloy B is used where its resistance to hydrogen chloride or aluminum and copper chlorides is needed. Alloy C withstands many corrosive media and may be called the universally corrosion resistant alloy. It can be used in handling wet chlorine gas, ferric chloride, cupric chloride, phosphoric acid, acetic acid, nitric acid and mixtures of nitric and hydrofluoric acids. Because of its universal corrosion resistance Alloy C is used for batch-type chemical reaction vessels in small chemical plants. This permits the use of one vessel for many different reactions. Alloy D is available only in castings, while alloys B and C are produced in wrought forms.

The Haynes high-temperature alloys are widely used in aircraft power plants where time, temperature, stress and strain are factors in high-temperature operation. New alloys are evaluated by stress-rupture, creep-rupture and high-temperature fatigue tests, but the final proof must be based on how the material reacts in an actual engine.

Slides were used to show graphically the properties of alloys B, C, Multimet and No. 25. The latter is a new wrought high-temperature alloy having exceptional room-temperature ductility. Aircraft applications of these alloys include turbo-supercharger buckets, gas turbine vanes, tail pipes and exhaust collector rings. Alloy C is used industrially for heat treating trays and furnace parts.

Ingot-to-Strip Operations Observed at Bethlehem

Reported by A. E. Leach
Metallurgical Department
Bell Aircraft Corp.

The annual plant visitation of the Buffalo Chapter A.S.M. was enthusiastically attended by approximately 150 members on the night of Oct. 11.

The Bethlehem Steel Co., Lackawanna, N. Y., was the gracious host for dinner at the Bethlehem Supervisors Club and a tour of the openhearth, blooming mill, and strip mill facilities.

The tour was well coordinated to demonstrate the progression of ingot to finished strip. The chapter members watched a heat being tapped from an openhearth and poured into ingot molds and then observed the blooming mill breaking down the ingots. The tour was ended at the strip mill where the steel was rolled into sheet and packaged for shipment.

Because the Lackawanna Works of the Bethlehem Steel Co. constitutes the fifth largest steel mill in the world, it was necessary to use bus transportation between the various points of interest. Though the entire evening was devoted to the tour, only a small part of the plant operations was actually visited by the group.

Bridge Welding Awards Offered

The 1952 Award Program of the James F. Lincoln Arc Welding Foundation will be on the subject of "Welded Bridges for Steel Conservation", and is dedicated to the national interest through the conservation of steel.

Each participant may select the type of highway bridge he wishes to present. Each entry must include two designs for comparison—one of a riveted bridge, and the second of a welded bridge indicating weight-saving advantages.

Awards totaling $16,100 will be given to the designers of the 15 best entries. Closing date for the contest is July 15, 1952. A booklet detailing the rules for the contest is available from the Secretary, James F. Lincoln Arc Welding Foundation, P. O. Box 3035, Cleveland 17, Ohio.

Takes Post in San Francisco

A. C. Woolley, past chairman of the Oregon Chapter A.S.M., and formerly general manager of Instrument Service, Inc., Portland, has been appointed manager of the San Francisco Industrial Division of Pacific Scientific Co.

Production Experience With Gears and Shafts of Boron-Treated Steel Cited

Reported by R. J. Huebner
Electric Auto-Lite Co.

The relative merits of low-alloy boron-treated steels and their relation to our national economy were presented before the Toledo Chapter A.S.M. on Oct. 11. The chapter opened its fall season a month earlier than usual to hear this important and timely address on "Emergency Alloy Steels" by Wilson T. Groves, metallurgical research engineer, Spicer Mfg. Div. of Dana Corp.

In the processing of production gears and shafts at Spicer, no difference in forging or machining had been detected between the 80B00 series steels in the carburizing grades and the 8600 series steels previously used, Mr. Groves said.

Although the 80B00 steels have considerably less hardenability in the carburized case than 8600 steels, Spicer engineers have been able to obtain satisfactory surface hardness after oil quenching and drawing of parts having sections as large as 2½ in. diameter without major changes in heat treating methods. In general, the heat treat distortion is about the same as obtained with 8600 steel with the exception that considerably more bore shrinkage is encountered with the 80B00 steel.

Slides showing curves of endurance tests indicated that the fatigue properties of gears made from 80B00 steel compare favorably with 8600 gears processed similarly. There is little difference between 80B00 and 8600 gears in their resistance to chipping during clashing.

Substantial improvement in fatigue properties and resistance to chipping for both 80B00 and 8600 carburized gears was obtained by utilizing a martempering operation instead of the conventional oil quench, the speaker said. He thought that the improvement in fatigue properties might be due to a better distribution of stresses or a decreased notch sensitivity in the martempered parts, but doubted that it is due to a difference in residual stresses.

A slide was projected which showed the residual stresses existing at various distances from the surface of two carburized bars, one martempered and one conventionally oil quenched. There was little difference in the shape of the curves or the magnitude of the residual stresses.

S. L. Widrig, chief metallurgical engineer of Spicer, added some brief comments during the question period following the meeting, and Robert J. Huebner of Electric Auto-Lite Co. acted as technical chairman.

Columbia Offers Scholarships

The School of Mines of Columbia University has announced the availability of several Henry Krumb Scholarships. The scholarships are awarded annually to worthwhile students working for their B.S., M.S. or E.M. degrees in mining, metallurgy and mineral engineering.

The recipient is provided with $1000 a year plus traveling expenses to New York (within the U. S.). The scholarships are granted on the basis of ability and not necessarily of need.

Application blanks and further information may be secured from the Office of University Admissions, Columbia University, New York 27, N. Y. Applications must be filed before Feb. 20, 1952.

ADDITIONAL METAL SHOW EXHIBITORS

The following firms exhibited their products and services at the National Metal Exposition in Detroit in October. The description of their exhibits, together with the names of those in attendance, was received too late to be published in the Official Program of the National Metal Congress. The information is reproduced herewith for the benefit of those who save the list of exhibitors in the program as a reference source.

Ball Tool Co., Detroit. **Booth H-518.**
Exhibiting: New precision toolroom surface grinder.
In attendance: Howard G. Henry, Harry LaFluer, Edward Esper, Bill Suerdick.

Collins Granite and Surface Plate Co., Los Angeles, **Booth H-209.**
Exhibiting: Granite surface plates.
In attendance: Lee Collins, Edith Collins.

Detroit Regulator Co., Detroit. **Booth B-214.**
Exhibiting: Controls and regulators.
In attendance: F. Kern, Jr., president; D. Zorn, vice-president; L. Lorentzen, W. Predhomme.

Detroit Sheet Metal Works, Detroit. **Booth C-132.**
In attendance: W. H. Kraus, president; H. LaDouceur, N. C. Marshall, O. E. Fenn, Erwin Bachrach, B. DeVore, V. Bocci, Walter Krouse, F. Tolomio, G. Reinholz, R. Geeson, R. Schearer, L. Bumler, J. Byers, C. Orr, C. Bruehan.

Herman Stone Co.—Fors Sales Co., Detroit. **Booth B-112.**
Exhibiting: Herman granite surface plates, air and hydraulic equipment, pumps, cylinders and valves, Stralton hydraulic hand crane, inspection equipment.
In attendance: William J. Fors, Lester Carriere, Henry George, Don Meredith, Leroy Copea, Robert Mayne, Tom Shively, Robert Maines.

Hitchcock & Sons, R. C., Minneapolis. **Booth H-205.**
Exhibiting: Brass, aluminum, magnesium and permanent mold castings.
In attendance: Harold M. Hitchcock, secretary-treasurer.

Hydroway Sales, Inc., Detroit. **Booth H-107.**
Exhibiting: Hydraulic crane scales—from 2 to 20 tons capacity.
In attendance: William M. Wise, president; Louis A. Wise, James H. Stewart, Merrill Ericson, John R. Davis, William P. Reid, A. A. Caille, R. H. Koppin, C. V. Kennedy.

Pawley Enterprises, Wallace, Los Angeles. **Booth H-410.**
Exhibiting: Standard-Hampton speed chuck, Trautman cutoff tool, Mac-Pac vise.
In attendance: Wallace Pawley, Cecil B. Jones, Herb Trautman, Robert F. Budinger.

Preston Co., Horace G., Detroit. **Booth H-538.**
Exhibiting: Wearwell leather packings and gaskets for hydraulic pneumatic service.
In attendance: Wilbur J. Wright, sales manager (Lakewood, Ohio), Robert Broestl (Lakewood, Ohio), Leslie G. Wright, president (Detroit, Mich.).

Primeweld Corp., Detroit. **Booth A-209.**
Exhibiting: Terminal fabricating and welding machine. Fusionette spot welder.
In attendance: Harry Z. Marx, director of sales, Ray Yearwood, Edward Rosar, August Wallick, L. P. Martz, R. G. Peters, Chas. E. Monahan.

Ryan Co., Walter S., Royal Oak, Mich. **Booth H-207.**
Exhibiting: Universal milling machine, material testing machine.
In attendance: Walter S. Ryan, John C. Berlin, Roy W. Thunberg, T. S. Bindshedler.

Superdraulic Co., Detroit. **Booth H-105.**
Exhibiting: Hydraulic pumps, valves and cylinders.
In attendance: H. L. Wise, president, R. E. Tamm, H. Houghton, L. Meyers, R. W. Wise, R. C. Griffith, W. Chorkey, E. Juiliani.

United Platers, Inc., Detroit. **Booth B-110.**
Exhibiting: Metal finishing services.
In attendance: Al Drury, Glen Friedt, Jr., Jack O'Dwyer, Jim Thompson.

Vanadium Corp. of America, New York. **Booth H-435.**
In attendance: Gustav Laub, Jerome Strauss, R. T. Chandler, H. E. Orr, R. F. Hancock, G. W. Johnson, J. B. Girdler, Frank St. Vincent, R. H. Filsinger, Jr., J. H. McGraw, L. G. Tinkler, G. S. Lindberg, P. H. Shaeffer, T. A. Claiborne, H. H. Wilder, D. E. Wyman, D. L. Edlund, T. W. Merrill, R. W. Rebholz.

Telephone Manufacturing Plant Inspected; Talk on Materials Selection Given

Reported by George F. Sommer
Metallurgist, Link-Belt Co.

An interesting diversion from the usual evening meetings of the past several years was planned for the October meeting of the Indianapolis Chapter A.S.M. A technical talk on "Selecting Materials for Telephone Manufacture" by Harvey A. Anderson, raw materials engineer, Western Electric Co., Inc., Chicago, was combined with a tour of the company's new Indianapolis Shadeland plant, where telephones for the entire Bell System are manufactured.

After luncheon as guests of Western Electric in the new cafeteria, the group assembled in the lecture room for Mr. Anderson's talk and a film introducing the Shadeland plant. Groups of approximately six were then formed to expedite the subsequent inspection tour.

Telephone equipment is designed for a 30-year life, according to Mr. Anderson. After this period the equipment normally becomes obsolete and is replaced. Materials are selected and specifications written by the Bell Laboratories.

Acceptance testing by Western Electric is performed on incoming materials at the various plants of the System, and quality control techniques—pioneered by the Bell System in this country—are used extensively. Each raw material is given a number with an accompanying engineering description. This number is unique for that particular item and follows it through manufacture. Complete records are retained on these numbers so that a given type of unit can be produced years later to work on the same system as the original units. As an example, hand-crank wall sets are still being produced, Mr. Anderson mentioned.

Two displays in the lecture room contained various telephone sets manufactured at Shadeland and samples of the many raw materials which go into such equipment.

The Shadeland plant has recently been completed and is a modern, clean and well-lighted plant. Considerable interest was shown in the die-casting, heat treating, and plastic molding equipment. The laboratories, of course, caught the attention of many of the members.

Mr. Anderson was introduced by H. S. Snell, superintendent of manufacturing engineering.

Almen Speaks at Cincinnati

Reported by Geo. B. Reisenberg
Armco Steel Corp.

Members and guests of the Cincinnati Chapter A.S.M. were privileged to hear John O. Almen, research consultant of the General Motors Corp., discuss the "Effect of Residual Stresses on the Fatigue Strength of Structural Members" on Oct. 11. Mr. Almen's talk has been reported in detail in the November issue of *Metals Review*, page 12.

Ten Years Ago
Quotes From Metals Review
December 1941

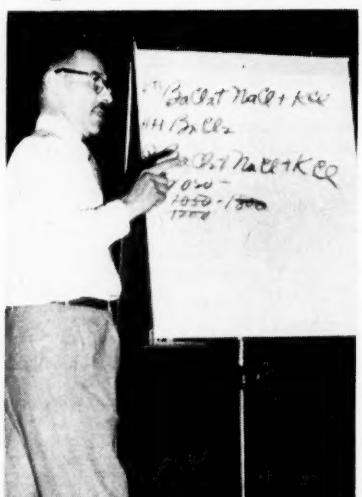
"For America's defense inspectors, a new low-priced guide book on 'Inspection of Metals' by HARRY B. PULSIFER† has been published by the American Society for Metals."

†Deceased.

Indianapolis Hears About Boron

Murray C. Udy (Left) of the Metallurgical Research Staff at Battelle Memorial Institute Spoke on "Boron in Steel" Before the Indianapolis Chapter on Sept. 17. Center is Howard J. Fletcher of E. F. Houghton & Co., chairman, and left, J. D. Duncan of Link Belt Co., secretary

Explains Factors in Salt Bath Selection



W. P. Fitz-Randolph Demonstrates Various Salt Combinations

Reported by L. F. House
Research Laboratories
Armco Steel Corp.

Proper selection of the type of salt or salts to be used in heat treatment baths was explained by W. P. Fitz-Randolph of the Heatbath Corp. to the members of the Dayton Chapter A.S.M. at the Sept. 12th meeting.

After tracing the history of molten salts for heat treatment, the speaker cautioned his audience of the dangers involved in the mishandling of molten salts. The choice of the salt or a combination of several salts depends on the temperature at which the bath is to be operated. Consideration should be given as to whether a salt will oxidize rapidly at operating temperature; or whether dragout losses will lower the efficiency of the molten salts.

When more than one bath is used in successive heat treatments, selection of salts should be governed by the effect of dragout from one bath to another. In such an operation the dragout may be either detrimental or advantageous, depending on the salts selected for the respective baths.

Following Mr. Fitz-Randolph's talk an open discussion session was held, during which the speaker answered many questions from the floor.

Many Variables in Machine Shop Trouble Shooting

Reported by L. F. Janssen
John Deere Des Moines Works

No two machine shops are alike, even though the products manufactured are practically identical. Likewise, the machines themselves vary greatly, even though the kind and model are identical. These two factors, which enter into "Trouble Shooting in the Machine Shop" were pointed out by W. H. Splinter of Republic Steel Corp., speaking before the Des Moines Chapter A.S.M. on Oct. 9.

The machine operator, however, is most instrumental in making acceptable parts, much depending upon the skill of the machinist.

Another influential factor is cutting fluid. Fluids are used to keep the tool and work cool, provide a good finish, aid in formation of chips, wash away chips and prevent corrosion.

The proper type and size of machine tools must be chosen for every job. Every position on multiple tool machines should be utilized whenever possible.

Correct spindle speeds and tool feeds vary with the material being used and the type of operation being performed. The prescribed speed for B-1112 steel (the standard for machinability comparisons) is 165 surface ft. per min. for turning and forming. Tapping speeds in general are reduced 10% from threading speeds.

The drill is the most important tool in the shop, Mr. Splinter asserted. The angle, clearance and webb thickness must be varied for different materials. If these factors are not proper, work hardening will occur and cause failure in taps and reamers in subsequent operations. Excessive margin width is the most common shop error.

Since it is impossible to vary the grind for each of the hundreds of different materials placed in a machine, tools are ground three different ways—for hard, soft and abrasive materials. In all cases a maximum of metal behind the cutting edge of the turning tools is a requisite.

Some of the other factors Mr. Splinter mentioned are:

Cold drawn steel will machine better than hot rolled in the same chemistry up to a certain carbon content.

Increased feed helps resist abrasion.

Speed and feed determine the time per piece, but not necessarily the net production.

In general, higher speeds result in better surfaces and higher feeds in better tool life.

Aging in carbon and alloy steel increases machinability.

A smoothly ground tool results in longer tool life.

Welding Contest Announced

Announcement has been made by the Resistance Welder Manufacturers Association of its annual Prize Paper Contest, which offers a total of $2250 in prizes for outstanding papers dealing with resistance welding subjects. The contest is open to those engaged in industry or research laboratory work, universities (instructors, graduate students or research fellows), and undergraduate students.

The judges will be appointed by the American Welding Society and awards will be made at the 1952 fall meeting. For complete details write to the Resistance Welder Manufacturers Association, 1900 Arch St., Philadelphia 3, Pa.

Ten Years Ago

Quotes From Metals Review
December 1941

"The Federal Bureau of Investigation has solicited the cooperation of the A.S.M. in connection with its defense program . . . Arrangements can be made with the FBI to provide coffee speakers for chapter meetings, where they will discuss the work of the Bureau."

Life-saver for Users of Nickel Steels

If you are among those handicapped by government restrictions on nickel-bearing 18-8 stainless, large Ryerson stocks of straight chrome stainless may prove to be a life-saver. For example, many who formerly used type 302 sheets to meet mild corrosive action are finding a practical alternate in type 430. And this 17% chrome stainless is on hand now—ready for immediate delivery from your nearby Ryerson plant.

You can order type 430 sheets from Ryerson in all gauges from 10 to 26, in No. 2B or No. 4 finish—and in almost any quantity. You can also get quick shipment of these additional straight-chrome products: type 405 sheets—types 410 and 430 plates—and type 416 bars.

In this stock, you may well find a steel that will enable you to maintain satisfactory quality in your product until nickel-bearing steels are again available. So now for stainless, we urge you to consider the versatile chromium stainless steels in Ryerson stock.

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS LOS ANGELES • SAN FRANCISCO

RYERSON STEEL

Editor Lauds Efforts of Plant Executives As Hosts to W.M.C. Study Tour Group

By Harold J. Roast

Consulting Editor for Metal Progress

A heartening experience was provided the writer in an opportunity to accompany Tour Group No. 2 of World Metallurgical Congress conferees studying nonferrous refining, rolling and fabrication on half its itinerary. For two weeks he had an opportunity to observe the camaraderie among the 22 men from 11 countries, despite cultural and political backgrounds as diverse as Indian and Norwegian, Japanese and French.

Officials, technicians, staff-members of the various American firms that were visited, without any notable exception whatever, acted as proud and courteous hosts. When important members of foreign firms in the metal industries look back on a two-months absence and can say they feel more than well repaid for the time and energy expended, it is proof that Americans did themselves proud. Farewells that were heartfelt, genuine, proved that the horrible picture of America the aggressor so assiduously exhibited by unfriendly propagandists has in their minds no slightest basis in fact.

If the travels of Group 2 were a fair sampling of the 11 other study groups, and I think they were, the total sums up to an extraordinary opportunity for the interchange of ideas, not only of scientific and industrial matters but—what was at least equally important—of conditions sociological and economic in the various countries. From this knowledge grew understanding, all of which will, at least in some measure, facilitate the working together of the nations in the common effort to maintain peace.

Some notes on the personal and social activities of Tour Group No. 2 (in contradistinction to their technical activities) will illustrate the basis of the above conclusions. More technical observations are recorded in the November issue of *Metal Progress.*

In Chicago one of the plants visited was H. Kramer & Co., smelters and refiners of nonferrous scrap and producers of ingot metal. Every facility was provided for viewing the plant and acquainting the visitors with what was ahead of them. A moving picture was shown in the office indicating the various operations involved. At the close of the plant inspection, the group reassembled in the office for a lively question period.

Such was the pattern followed generally, day after day.

Long weekends were left open to the members to carry on by themselves. The writer accompanied one group to dinner in Chicago followed by a floor show. Our visitors enjoyed seeing Americans at play as well as at work. Adjournment to a quiet spot was followed by some three hours of "bull session" (I believe American collegiates would call it that) wherein conversation flowed freely between the various nationalities on art, sports, and morals. A spirit of great friendliness prevailed and all seemed to feel that they understood each other better.

On a Monday morning the metallurgical activities were resumed in a visit to Ampco Metal, Inc., in Milwaukee. This company specializes in aluminum bronze; it also makes other copper-base alloys—in all some six million pounds a month.

We were met at the plant by the officials of the company and briefed as to what we were going to see. Guides were provided to answer the numerous questions asked by their visitors.

The group left the Ampco plant feeling that the visit had been very much worth while and that they were much indebted to the company officials for their courtesy.

A noteworthy day was also spent at Dow Chemical Co.'s magnesium plants in Midland and Bay City, Mich. We were conducted to the plant auditorium where we were addressed by various officials with special reference to the employee-company relations.

After visiting the magnesium rolling mill plant the group was taken to lunch at the Midland Country Club where further opportunity was given for talking matters over with the company's representatives. After lunch we were driven to the magnesium foundry in Bay City. Here are produced the many items called for by aircraft, radar, jet engines, and other customers' items that are not amenable to fabrication from sheets or extrusion through dies.

The magnitude and diversity of the Dow Chemical Co. plant defies reduction to a short report; all one can do is to state the impression of one visitor. The courtesy and efficiency of the staff was much appreciated by the visitors. A tired but enthusiastic group boarded the bus and returned to Detroit.

The next day a visit was paid to Cadillac Motor Co.'s foundry and assembly plant in Detroit. Here again the company provided excellent guides from highly qualified personnel. Our visitors from overseas were much impressed with the speed and care taken in automobile production.

We saw the foundry operating almost entirely along continuous lines, and the spectacle of the various lines feeding into the main conveyor system was fascinating. The fact that each cylinder in each engine block was measured individually (notwithstanding that they were produced on a set of fixed and standard machines) and that these measurements were conveyed to the piston assembly area, so that each cylinder had exactly the right sized piston—all this impressed one with the high standard of manufacture prevailing in the Cadillac plant. For several reasons, the plant, we were told, was on a slow schedule—only 47 cars being turned out per hour—about one a minute!

National Officers Visit Boston

Boston Chapter Held Its National Officers' Night on Nov. 3. In the picture are Secretary W. H. Eisenman, Chapter Chairman Dow Robinson, President John Chipman, and Carl Floe, technical chairman. Dr. Chipman presented his talk on "Meeting the Country's Need for Metallurgists", and Secretary Eisenman offered some interesting statistics on national activities and some high points of the recent World Metallurgical Congress. At the close of the meeting, Dr. Floe presented a beautiful Omega calendar watch to Dr. Chipman on behalf of the Boston Chapter.

(Report by John L. Morosini; Photograph by H. L. Phillips)

New Films

Steel Foundry Practice

"Steel With a Thousand Qualities", a full-length, full-color industrial motion picture covering all phases of modern steel foundry operations and techniques for the production of carbon, special alloy, and stainless steel castings, has been completed by Lebanon Steel Foundry, Lebanon, Pa.

Running time for this 16-mm. sound film is 37 min. It was produced by Roland Reed Productions, Beverly Hills, Calif., and is available free of charge for showing to technical and engineering groups. Prints may be requested from Modern Talking Picture Service, Inc., 45 Rockefeller Plaza, New York 20, N. Y.

Seamless Tube Manufacture

A new educational motion picture in technicolor entitled "Walls Without Welds" has been released by National Tube Co. It is the story of modern manufacturing methods used in the production of seamless pipe and tubes. Prints of the film may be requested from United States Steel Co., Motion Picture & Visual Aids Section, Advertising Division, 525 William Penn Place, Pittsburgh 30, Pa., or from any of National Tube Co.'s district sales offices.

Metallurgy for Watches

Available from Hamilton Watch Co., Lancaster, Pa., is a new film entitled "Metallurgy in Miniature". The film explains the special kind of metallurgy that has developed and produced the new alloys used in fine watches. Hamilton's metallurgical research and metal processing facilities are pictured and explained. The film is a 16-mm. full-color motion picture with sound; running time is 15 min.

Annual Meeting Honors Past Chairmen and Ladies

Reported by J. P. Simpson
Chief Chemist
Canadian Car & Foundry Co.

The annual meeting of the Montreal Chapter A.S.M. last spring also celebrated Past Chairmen's and Ladies' Night. During the reception to past chairmen and their ladies, Mrs. R. McGillivray, former chapter secretary for many years, pinned pink carnations on all attending past chairmen.

The dinner, served to more than 200 persons, was followed by a program of entertainment. Jacques Royer, a member of the chapter, gave excellent interpretation to his piano selections, and T. Osborn then held his audience spellbound with his feats of legerdemain. The main speaker of the evening was W. M. Ford, Montreal Refrigerating & Storage, Ltd. His "Humorous Dissertation on Metals" kept the audience in a constant state of merriment. After the entertainment a drawing was held for some 25 door prizes donated by sustaining member firms.

Karl Baker, retiring chairman, then addressed the meeting briefly and thanked the Executive Committee for the support he had been given. Finally, he introduced A. M. Young, Aluminum Co., of Canada, as chairman-elect for 1951-52. Mr. Young presented the Past Chairman's Certificate and button to Mr. Baker.

Certificate Awarded

Milo J. Stutzman, Senior Metallurgist, Midwest Research Institute, Holds the 25-Year Membership Certificate Presented to Him by Hugh A. Springer of Sheffield Steel Corp., Chairman of the Kansas City Chapter for 1950-51. (Photo by C. P. Kenyon, Sheffield Steel Corp.)

Discount Offered to Members

By an arrangement with the publishers of the *Proceedings* of the Second Meeting of the International Committee of Electrochemical Thermodynamics and Kinetics, copies are being offered at a 20% discount to members of the American Society for Metals.

Most of the papers are in French, with a few in English and German. The book is published by Libreria Editrice Politecnica di Cesare Tamburini, Via Pascoli, 55, Milan, Italy, and the price is 3800 lire, or about $6.17. A.S.M. members are offered a 20% discount on this figure.

"Quench and Draw" Party Includes Preheat Period

Reported by Frederick P. Upton
Washington Technical Services

On Oct. 8th Washington Chapter A.S.M. had its annual Quench and Draw Party at the Old Georgetown Hall of Chirstian Heurich's Brewery. An expansion-producing buffet supper with unrationed quantities of Old Georgetown beer was followed by an evening of entertainment.

In the preheat period, two sports films were shown, the first showing how to get a low critical point in golf and the second some deep sea fishing scenes off the Florida coast.

After this the boys got really hot and were rolled at the running of the Broadway Handicap, complete with legit betting windows and bookies and payments in illegit money. Some members were completely descaled on coming from the mill, but others used their winnings in bidding on various items which were efficiently auctioned off by "Rosie" Rosenberg. Said items included not only gentlemen's kits and nylons for the girl friend, but also the left-over food. The tonnage of cole slaw was too great for the first successful bidder so it had to be auctioned off twice. This drew the party up short whereupon it dispersed fully tempered.

Prospective Members Invited to Social Evening

Reported by Dale C. McKissick
Pennsylvania State College

Penn State Chapter A.S.M. held a social meeting on the evening of Oct. 9 at the Acacia House. Interested prospective members were invited and given an opportunity to become acquainted with the members of the chapter.

Dean Steidle of the Mineral Industries School spoke of the many new developments in metallurgy and how it has advanced since he first became active in the school. Robert Caffrey explained some of the activities of the Society for the benefit of new members. Prof. William J. Reagan mentioned some of the men who will be technical speakers in the near future.

Frank Patrick of the Pennsylvania State College coaching staff provided the evening's entertainment with moving pictures of the Boston University vs. Penn State football game played on Sept. 29.

Ten Years Ago

Quotes from Metals Review
December 1941

"Plans for the Sauveur Memorial Museum, to be housed in A.S.M. national headquarters in Cleveland, have been outlined in a recent report from the committee in charge of the memorial."

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Jan. 21	Engineers Club	H. L. Hovis	Chemistry and Metallurgy in the Watch Industry
Boston	Jan. 4	Hotel Shelton	John Wulff, Howard Taylor	Powder Metallurgy vs Precision Casting
Buffalo	Jan. 10	Hotel Sheraton		Forgings vs Castings vs Stampings
Calumet	Jan. 8	Phil Smidt & Son Whiting, Ind.	C. E. Sims	Technology in the Iron and Steel Industry
Canton Massillon	Jan. 8	Mergus Restaurant	S. A. Wenk	Nondestructive Testing
Chicago	Jan. 14	Museum of Science & Industry	W. M. Baldwin Jr.	Residual Stresses in Metals
Cincinnati	Jan. 10	Engineering Society	F. L. LaQue	Corrosion Studies
Cleveland	Jan. 7	Hollenden Hotel	Donald Ruhnke	Boron Steels
Columbus	Jan. 2	Broad St. Church of Christ	R. A. Flinn	Ductile Iron
Dayton	Jan. 9	Engineers Club	G. A. Roberts	Recent Developments in High Speed Steel
Detroit	Jan. 14	Rackham Bldg.	Roy D. Allen	The Heat Treatment of New Alloy Steel Compositions
Fort Wayne	Jan. 14	Howard Johnson's	James A. Lansing	Recent Developments in the Malleable Industry
Hartford	Jan. 8	The Hedges	D. J. Richards	Residual Stresses
Indianapolis	Jan. 21	McClarney Restaurant	E. A. Hoffman	The Machining of Metals
Lehigh Valley	Jan. 4	Hotel Traylor, Allentown, Pa.	B. N. Ames	Shell Molding
Louisville	Jan. 8	Kapfhammer's Party House	G. A. Roberts	Toolsteels (National Officers Night)
Mahoning Valley	Jan. 8	Post Room, V.F.W.	H. W. McQuaid	Comparison of Electric Furnace and Openhearth Economics
Milwaukee	Jan. 15	Hotel Wisconsin	G. A. Roberts	New Developments in Toolsteels
Missouri School of Mines	Jan. 9			
Montreal	Jan. 7	Spanish Room, Queen's Hotel		Movie Night
Muncie	Jan. 8		Walter C. Troy	Residual Stress of Heat Treating
New Haven	Jan. 17	Hammond Lab. Yale University		Heat Treating for Surface Protection
			Haig Solakian	Salt Bath Treating Method
			Robert Henry	Lithium Atmospheres
New Jersey	Jan. 21	Essex House, Newark	C. E. Birchenall	Radioactive Tracer Techniques in Metallurgy
New York	Jan. 14	Schwartz Restaurant	B. Alexander	Sintering of Metals
Northern Ontario	Jan. 11	Windsor Hotel	B. R. Queneau	Ingot Solidification
North Texas	Jan. 3		John Chipman	Meeting the Country's Need for Metallurgists
North West	Jan. 17	Covered Wagon	Roy D. Haworth, Jr.	Wear, Abrasion and Tungsten Carbide
Notre Dame	Jan. 9		F. K. Landgraf, Jr.	Fractography
Ontario	Jan. 4	Royal York Hotel	Dean Fry	Die Castings
Ottawa Valley	Jan. 8	P.M.R. Labs.	James G. Dick	Modern Copper-Base Alloys
Penn State	Jan. 8	Art Gallery, School of Mineral Industries	A. A. Smith	Technical Properties and Applications of Lead
Philadelphia	Jan. 25	Engineers Club	T. E. Eagan	The Practical Aspects of Nodular Iron
Pittsburgh	Jan. 10	Roosevelt Hotel	Howard C. Cross	High-Temperature Properties of Metals
Purdue	Jan. 15	Purdue Union	R. R. Kennedy	Use of Materials in Aircraft
Rochester	Jan. 14	Howard Johnson's	W. R. Fraser	Recent Developments in High Speed Steel
Rocky Mountain				
Pueblo	Jan. 17		K. L. Fetters	Physical Chemistry of Steel
Denver	Jan. 18			
Rome	Jan. 7	Elks Club	Philip L. Knight	Furnace Atmospheres
Springfield	Jan. 21	Sheraton Hotel	Howard F. Taylor	Modern Foundry Techniques
St. Louis	Jan. 3	De Soto Hotel	J. A. Koch	Air Hardening Toolsteels
Syracuse	Jan. 2	Hiawatha Room Onondaga Hotel	J. D. Dickerson	The Metallurgy of Boron Steels
Terre Haute	Jan. 7	Indiana State Teachers College Student Union		Lubrication
Texas	Jan. 8	Ben Milam Hotel	John Chipman	The Field of Steelmaking
Toledo	Jan. 10	Maumee River Yacht Club	Wm. M. Ball Jr.	History and Uses of Brasses & Bronzes
Tri-City	Jan. 8		E. M. Kipp	Multi-Functional Lubricants
Washington	Jan. 14	Dodge Hotel	J. B. Johnson	Heat Resisting Alloys
Wichita	Jan. 15	Knights of Columbus Hall	J. E. Dato	Sigma Welding
Worcester	Jan. 9	Hickory House	E. E. Thum	Atomic Energy
York	Jan. 8	York, Pa.	O. R. Hills	Springs and Spring Materials

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio
W. W. Howell, Technical Abstractor

A GENERAL METALLURGICAL

271-A. Research Is Important to United States Pipe & Foundry Co. Edwin Bremer, Julian B. McFarland. *Foundry*, v. 79, Nov. 1951, p. 88-91, 198.

Equipment and procedures of research and development department of above firm. Various phases of metallurgy and metalworking of ferrous and nonferrous metals are covered. (A9)

272-A. Simple Design Speeds Blower Wheel Assembly. *Iron Age*, v. 168, Oct. 25, 1951, p. 106-107.

How Viking Air Conditioning's simplified design and manufacturing methods have boosted output of completed assemblies to more than 500 per day. Main operations are cutting and forming, spot welding, enameling, and assembly. (A5)

273-A. Istituto Sperimentale dei Metalli Leggeri; Light Metal Research at Novara. *Metal Industry*, v. 79, Oct. 5, 1951, p. 282-284.

Facilities and research programs of Italian organization. (A9, Al, Mg)

274-A. Non-Ferrous Metals in Italy. Ian S. Menzies. *Metal Industry*, v. 79, Oct. 5, 1951, p. 300-302.

Ores, primary production, and manufacturing capacity. Includes map. (A4, B10, EG-a)

275-A. Italian Copper Industry. *Metal Industry*, v. 79, Oct. 5, 1951, p. 303.

Ore resources, refining, alloy production, and primary fabrication. (A4, B10, Cu)

276-A. Italian Aluminium Industry. Rosario Carmina. *Metal Industry*, v. 79, Oct. 5, 1951, p. 304-306.

Production and primary fabrication. Future prospects. (A4, Al)

277-A. Increased Steel Output to Supply Demands. *Mining World*, v. 13, Oct. 1951, p. 10-14.

Economic survey showing U. S. steel capacity and facilities by companies and by locations; also raw-material reserves owned by the various companies in the U. S. and abroad. (A4, ST)

278-A. Domestic Iron Mining Industry Prepares for Record Demand. *Mining World*, v. 13, Oct. 1951, p. 15-19, 90-92.

Preparations of various U. S. companies in connection with build-up of reserves and expansion of production facilities. (A4, B12, Fe)

279-A. Stainless Jet Engine Stampings Mass-Fabricated on Production Line. Gilbert C. Close. *Steel*, v. 129, Oct. 29, 1951, p. 64-65.

Formed and welded on conveyor lines, sheet-metal parts such as inner and outer combustion chambers are built to machine-shop tolerances at Solar Aircraft Co., San Diego, Calif. (A5, G1, K3, SS)

280-A. Research Team Points Efforts Toward Practical Values. A. H. Allen. *Steel*, v. 129, Oct. 29, 1951, p. 77, 85-86.

Organization and activities of Horizons, Inc., Cleveland, founded in 1947. Outlines four current projects. (A9)

281-A. Waste Problems In the Mineral Industries. James Boyd. *Chemical and Engineering News*, v. 29, Nov. 5, 1951, p. 4671-4673.

The importance of industrial wastes. Water and air pollution, recovering rare metals, losses through waste heat, and fly ash in concrete. (A8)

282-A. Scrap—Availability, Present Physical Condition, and Contamination. Ralph W. Farley and Ray J. McCurdy. *Electric Furnace Steel Conference, Proceedings*, v. 8, 1951, p. 8-14; disc., p. 14-18.

Previously abstracted from *Journal of Metals*. See item 324-A, 1950. (A8, Q5, ST)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

283-A. Reclaiming Alloys From Tool Steel Mill Wastes. A. J. Schied, Jr. and W. J. Mathews. *Iron Age*, v. 168, Nov. 8, 1951, p. 125-128.

Critical alloys which are ordinarily lost in the form of mill scale, grinding chips and other process waste during toolsteel manufacture are now being recovered by an electric-furnace process. Every pound of alloy recovered adds 5 lb. of useful material available. Alloy thus salvaged could amount to 5-8% of our total toolsteel production. (A8, D5, TS)

284-A. General Outlook for Metals. Joseph Zimmerman. *Journal of the American Zinc Institute*, v. 29, 1951, p. 17-25.

Recent economic developments and future trends. (A4)

285-A. The Current World Zinc Situation. R. L. Wilcox. *Journal of the American Zinc Institute*, v. 29, 1951, p. 80-97; disc., p. 97-100.

Economic analysis. Includes tabular and graphical data. (A4, Zn)

286-A. Outlook for Die Castings in 1951. David Laine. *Journal of the American Zinc Institute*, v. 29, 1951, p. 100-105.

Economic survey and forecast. Emphasis is on Zn die castings. (A4, E13, Zn)

287-A. Brass in 1951. T. E. Veltfort. *Journal of the American Zinc Institute*, v. 29, 1951, p. 105-111.

Economic analysis and forecast, with special reference to brass-mill production. Includes graphs covering brass-mill shipments, copper production, and durable-goods production for 1918-1951. (A4, F23, Cu)

288-A. Punched-Card Evaluation of Technical Data. (In German.) Otto Hengstenberg. *Stahl und Eisen*, v. 71, July 19, 1951, p. 776-781; disc., 781.

Possibilities of use and examples from the steel industry. Use of new types of machine-sorted cards such as the IBM. 17 ref. (A9, U8, ST)

289-A. We'll Have to Plan Now to Meet Future Zinc Needs. *Engineering and Mining Journal*, v. 152, Nov. 1951, p. 79-83.

Economic analysis indicates that increased mine and smelter capacity is needed, plus encouragement of concentrate imports. (A4, Zn)

290-A. (Book) **Design Work Sheets: Facts; Figures; Formulas.** 10th Series. 164 pages. 1950. McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

A compilation of reprints from *Product Engineering*. Individual "Reference Book Sheets" or articles on Bearings, Calculations, Constructions, Drives, Electrical Devices, Finishing, Gears, Hydraulics and Pneumatics, Materials, Mechanisms, Plastics, Springs, Steels, and Welding and Forming. (A general)

291-A. (Book) **1951 Scrap Institute Yearbook.** Ed. 12. 110 pages. 1951. Institute of Scrap Iron & Steel, Inc., 1729 H St., N.W., Washington 6, D. C. $1.00.

Annual survey of operations shows purchased scrap in 1950 reached 29,402,000 tons, a new all-time high. Data on scrap production, consumption, prices, and specifications. (A4, A8, B22, ST)

292-A. (Book) **Steel Serves the Nation. 1901-1951. The Fifty Year Story of United States Steel.** Douglas A. Fisher. 227 pages. 1951. U. S. Steel Co., 71 Broadway, New York 6, N. Y.

Accomplishments and services of the United States Steel Co. Numerous illustrations of all phases of the steel industry. Statistical data are tabulated. (A4, ST)

293-A. (Book) **Technisches Fachwörterbuch der Grundstoffindustrien.** Teil I. Englisch-Deutsch. (Technical Dictionary for the Basic Industries. Vol. I. English-German.) G. E. Lenk and Börner. 568 pages. 1951. Vandenhoeck & Ruprecht, Postfach 77, Göttingen 20b, West Germany. $10.00.

Covers 45,000 technical terms in mining, mineral beneficiation, drilling, geology, mineralogy, smelting and refining (including electrometallurgy), metalworking, physics and chemistry of metals, metal testing, machinery, construction, materials handling, and auxiliary sciences. (Vol. II, the German-English part, will be ready in 1952.) (A10)

B

RAW MATERIALS AND ORE PREPARATION

263-B. Agglomeration. *Chemical Engineering,* v. 58, Oct. 1951, p. 161-174.

Comprehensive report on process used in a wide variety of industrial operations. Main sections cover pressure compacting to make tablets, bricks, blocks, briquettes, etc.; extrusion of plastic masses in ceramics and chemical technology; forming spheres by tumbling (carbon-black pelletizing); granulation of fertilizers, pelletizing of ores and coal; and sintering of ores. 22 ref. (B16, H10)

264-B. Processing Aluminum Ore. Evans W. Buskett. *Mining Congress Journal,* v. 37, Oct. 1951, p. 32-34, 90.

Procedures and equipment for recovery of Al metal from bauxite, using the Bayer process and its modifications. (B14, Al)

265-B. Taconite Iron Units for the Future. *Mining World,* v. 13, Oct. 1951, p. 20-23.

Present taconite beneficiation operations, research programs, and future prospects. (B14, Fe)

266-B. Foreign Sources of Iron Ore. *Mining World,* v. 13, Oct. 1951, p. 36-41.

An illustrated survey. (B10, Fe)

267-B. Iron Ore Beneficiation Expands; Finer Sizes Subject of Study. *Mining World,* v. 13, Oct. 1951, p. 47-50.

Treating wash ores, selective media concentration, heavy media separation, abrasion milling, Humphreys spiral, Weining concentrator, DSM cyclone separator, jigging, magnetic concentration, milling nonmagnetics, agglomeration, and dust collection. (B13, B14, Fe)

268-B. Measuring the Viscosity of Ferrous Slags. (In French.) M. D. E. Jonckers. *Métallurgie et la Construction Mécanique,* v. 83, Apr. 1951, p. 235, 237, 239-240; May 1951, p. 341, 343, 345, 347, 349.

Various viscosimeters are diagrammed; viscosities of slags in binary, ternary, and quarternary systems are investigated. Concluding part deals with blast furnace and basic bessemer slags. (B21, D1, D3, ST)

269-B. The Development of Mining and Ore Beneficiation in Bolivia During the Last Ten Years. (In German.) Friedrich Ahlfeld, and Richard Knobler. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Aug. 1951, p. 293-296.

Emphasis is on tin ores, but mention is also made of W, Ag, Pb, Zn, Sb, and Cu. (B general, Sn, EG-a)

270-B. Briquetting of Ore Fines for Steel Plants. (In Polish.) K. Radzwicki, W. Madej, and W. Stronczak. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 3, 1951, p. 173-181.

Details of laboratory and industrial tests. Jarcho's method was modified by replacement of NaCl with H_2SO_4 or spent pickle liquor containing H_2SO_4. (B17, Fe)

271-B. Columbium and Tantalum in Austenitic Stainless Steels. Jerome Strauss. **Columbium-Tantalum Alloys and Their Use in Type 347.** H. A. Grove. *ASTM Bulletin,* Oct. 1951, p. 17-19.

Data show that the substitution of the presently available 40% Cb, 20% Ta ferroalloy for the standard type of ferrocolumbium previously used is practicable. Mechanical properties and corrosion resistances of the steels thus produced are tabulated and charted. (B22, Q general, R general, SS, Fe-n)

272-B. Examination of Manganese Ore From Fiji. *Commonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne,* Investigation 309, Jan. 4, 1951, 2 pages.

Possibility of using simple means of concentration to separate high-grade concentrates. (B14, Mn)

273-B. Flotation of Antimonial Ore From Metz Gold Mines, Hillgrave, N. S. W. *Commonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne,* Investigation 344, Feb. 8, 1951, 3 pages.

Data are tabulated on single-stage flotation tests showing the effect of PbAc and $CuSO_4$ as activators and the effect of varying degrees of grinding. (B13, B14, Sb, Au)

274-B. Use of Iron Ore in Steelmaking. J. E. Arthur. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 5-7; disc., p. 7.

Use as a source of oxygen. Reviews the composition of existing domestic deposits. An approximate analysis of South American ores is also given. (B22, B10, ST)

275-B. More Titanium Oxide Now Available. Part I. and II. D. I. Brown. *Iron Age,* v. 168, Nov. 1, 1951, p. 119-123, Nov. 8, 1951, p. 129-132.

Part I: Allard Lake ilemite, which contains 35% TiO_2 and 40% Fe and is the only large deposit of this particular type known. Part II: An electric furnace 54 ft. long equipped with six electrodes is used to make a high-TiO_2 concentrate. A slag containing about 75% TiO_2 and Fe is tapped from this furnace. The feed ore is crushed, mixed with anthracite coal and gravity fed into the furnace through a sprung arch roof. The furnace is all-basic brick and operates as a sealed unit under slight pressure. (B10, B15, Ti, Fe)

276-B. A Method for Handling Steelmaking Slag. *Iron and Steel Engineer,* v. 28, Oct. 1951, p. 85-89.

Method developed at Consett Iron Works, England, and originally intended to improve the handling of flushing slag. The granulated product is sintered and used as blast-furnace charge material. (B21, D1, Fe)

277-B. Design and Operation of National Tube's Sintering Plant. E. O. Austermiller and W. A. Cureton. *Iron and Steel Engineer,* v. 28, Oct. 1951, p. 111-117, disc., 117-118.

Plant layout, raw materials, sintering practice, and future considerations. A flowsheet of the plant is given. (B16, Fe)

278-B. Sintering Practice at Josephtown Smelter. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1045.

Discussion of above paper (by H. K. Najarian, Karl F. Peterson, and Robert E. Lund). (Feb. 1951 issue, see item 32-B, 1951.) (B16, C21, Zn, Cd)

279-B. Control of Tailings From Washing Plants. Walter B. Lenhart. *Rock Products,* v. 54, Oct. 1951, p. 113, 148.

The crushing-grinding operation and concentrator of Ray Mines Div., Kennecott Copper Corp., Ray, Ariz. The ore treated is a porphyry and the specific gravity of the tailings and fineness parallels those of other copper porphyry operations. (B13, Cu)

280-B. Sources and Uses of Zinc. *Westinghouse Engineer,* v. 11, Nov. 1951, p. 186-189.

Surveys world resources, with emphasis on those available to the U. S. Uses and relative amounts devoted to each. Production methods. (B10, T general, Zn)

281-B. Properties of "Silex" Insulating Refractories. (In French.) M. Rocco. *Circulaire d'Informations Techniques,* No. 9, 1951, p. 1041-1045.

"Silex" refractory bricks are made from sintered rice hulls. Their pores are 20 times smaller than those of diatomaceous earths. Their various properties and possibilities of application, particularly in the open-hearth. (B19, D2, ST)

282-B. Recent Progress in the Wet Beneficiation of Acidic Ores. (In German.) Arnold Goltz. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 93, Aug. 1, 1951, p. 717-718.

Procedure applied to iron ore from the Salzgitter ore includes a flow chart of the operation. Process is claimed to be so efficient that relatively low-grade iron ores can successfully compete with high-grade foreign ores. (B14, Fe)

283-B. Beneficiation of Siegerland Siderite Sludges. (In German.) Gerhard Gerth. *Zeitschrift für Erzbergbau und Metallhuttenwesen,* v. 4, Sept. 1951, p. 334-337.

These sludges, which previously could not be utilized, can now be concentrated by the nozzle centrifuge, by the hydrocyclone separator, and by the hearth-beneficiation method. Materials recovered amount to 5400 tons of Fe and 1100 tons of Mn per year. The hearth-beneficiation method is shown to be most suitable for the particular case. (B14, Fe, Mn)

284-B. Research on Flotation of Arsenic-Rich Lead-Zinc Ores. (In German.) Werner Gründer and Bela Bunji. *Zeitschrift für Erzbergbau und Metallhuttenwesen,* v. 4, Sept. 1951, p. 341-344.

Small and large-scale flotation experiments designed to repress the As-bearing minerals and to reduce the arsenopyrite content of the lead blends. Flow charts and typical results. (B14, Pb, Zn)

285-B. Sherritt Gordon Develops Lynn Lake Nickel-Copper. Howard L. Waldron, Editor. *Engineering and Mining Journal,* v. 152, Nov. 1951, p. 72-78.

Geology, use of electromagnetic surveying, new reserves discovered, and new method for concentration. Basically the process consists of simultaneous oxidation and ammonia leaching of the green concentrates to produce soluble Ni, Co, and Cu compounds. Ni and Co are recovered in powder form. Advantages as opposed to conventional methods are low operating costs; high recovery of pure Co; and 75% recovery of sulfur as ammonium sulfate. (B14, Ni, Co, Cu)

286-B. Finding a Way to Handle the HMS Middlings Problem. E. C. Bitzer. *Engineering and Mining Journal,* v. 152, Nov. 1951, p. 91-95.

The Akins heavy-media separator has successfully been used to concentrate an iron-ore middling, but has failed to provide satisfactory results with a Zn ore. A series of tests was made to define the ability of the separator to produce a true middling product, and to determine the control factors involved. (B14, Fe, Zn)

287-B. Mineral Status of the Far East. Kung-Ping Wang. *Mining Engineering,* v. 3, Nov. 1951, p. 943-948.

Mineral production and resource picture of China, Japan, Korea, and Formosa; Hong Kong, Indo-China, Thailand, Burma, Malaya, Indonesia, the Philippines, and British Borneo. (B10)

288-B. "Russia's Mineral Potential" Criticized. Norman C. Stines. *Mining Engineering,* v. 3, Nov. 1951, p. 949-950.

Severely criticizes article by Paul Tyler in the June issue. (See item 167-B, 1951.) In view of residence

and personal experience in the Russian mining industry in the period 1909-1919, writer believes the present mineral productive capacity of Russia is to be greatly exaggerated by Mr. Tyler. (B10, A4)

289-B. The Metal Mining Industry in Japan. Robert Y. Grant. *Mining Engineering*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 190, 1951, p. 953-960.

History of metal mining in Japan and the characteristics of the industry as they existed from 1925 to 1945. Mining and milling operations. Role of the Japanese Government. Post-hostilities conditions and the present state of the industry. A short section discusses ore-dressing practice. (B12, B14, A4)

290-B. Collector Mobility and Bubble Contact. M. D. Hassialis and C. G. Myers. *Mining Engineering*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 190, 1951, p. 961-968.

Nature of a collector-coated mineral surface has been the subject of some experimentation and much speculation. Recognized elements of the problem are: nature of the forces holding these units to the mineral surface; orientation of the chemical units at the surface; and disposition of the collector units at the mineral surface. A new and heretofore unrecognized element is mobility of the collector units in the two dimensions of the solid-liquid interface. A series of experiments was made on galena particles. 22 ref. (B14)

291-B. Progeny in Comminution. A. M. Gaudin, H. R. Spedden, and Douglas F. Kaufman. *Mining Engineering*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 190, 1951, p. 969-970.

Application of radioactive Na as a tracer in study of grinding of albite. As a result, it is possible to trace the "progeny" of particles in the various size ranges. (B13)

292-B. Jaw Crusher Capacities, Blake and Single-Toggle or Overhead Eccentric Types. D. H. Gieskieng. *Mining Engineering*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 190, 1951, p. 971-974.

Capacity characteristics of jaw crushers. No attempt is made to discuss other characteristics, such as power consumption or screen analysis of product. (B13)

293-B. A New Surface Measurement Tool for Mineral Engineers. *Mining Engineers*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 190, 1951, p. 981-983.

Discussion of above paper (by F. W. Bloecher, Jr.) See item 86-B, 1951. (B general, S15)

294-B. A New Theory of Comminution. *Mining Engineering*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 190, 1951, p. 983-986.

Discussion of above paper (by F. C. Bond and J. T. Wang.) See item 236-B, 1951. (B13)

295-B. Comparative Results With Galena and Ferrosilicon at Mascot. *Mining Engineering*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 190, 1951, p. 986-987.

Discussion of above paper (by D. B. Grove, R. B. Brackin, and J. H. Polhemus.) See item 203-B, 1951. (B14, Pb, Fe)

296-B. The Probability Theory of Wet Ball Milling and Its Application. *Mining Engineering*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 190, 1951, p. 988-990.

Discussion of above paper (by Elliott J. Roberts.) See item 4-B, 1951. (B13)

297-B. Progress Report on Grinding at Tennessee Copper Co. *Mining Engineering*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 190, 1951, p. 990-991.

Discussion of above paper (by J. F. Myers and F. M. Lewis.) See item 194-B, 1950. (B13)

298-B. Flotation Rates and Flotation Efficiency. *Mining Engineering*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 190, 1951, p. 991-992.

Discussion of above paper (by Nathaniel Arbiter.) See item 241-B, 1951. (B14)

299-B. Flotation Tests on Korean Scheelite Ore. *Mining Engineering*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 190, 1951, p. 992-993.

Discussion of above paper (by Will Mitchell, Jr., C. L. Sollenberger, and T. G. Kirkland.) See item 16-B, 1951. (B14, W)

300-B. Geology of Uranium Deposits—A Condensed Version. Donald L. Everhart and Muriel Mathez. *U. S. Atomic Energy Commission*, RMO-732, May 1951, 33 pages.

General geologic features of some of the major types of deposits, together with examples. Their radioactivity characteristics, suggested sampling procedures, and means of evaluating the deposits. Tables give current data on common uranium minerals. (B10, B11, U)

301-B. Studies in the Carbonate-Uranium System. Part II. The Solubility of Sodium Uranyl Tricarbonate in Solutions of Certain Sodium Salts. K. B. Brown and J. M. Schmitt. *U. S. Atomic Energy Commission*, AECD-3229, Oct. 20, 1950, 27 pages.

Data are considered in their application to plant processes such as those employed in the carnotite mill at Monticello, Utah. (B14, U)

302-B. Studies of Recovery Processes for Western Uranium Bearing Ores. IX. Precipitation of Yellow Cake and of Low Level Vanadium. Emily L. Leyshon and C. F. Coleman. *U. S. Atomic Energy Commission*, AECD-3223, Nov. 9, 1950, 35 pages.

Summarizes studies made during the period Apr.-Oct., 1949, on the precipitation of "yellow cake", a sodium uranyl vanadate, from carbonate leach liquors. Also includes briefer studies of several methods of precipitating vanadium from the resulting "purified liquor", including hydrolytic precipitation after reduction, phosphate precipitation after reduction, precipitation of ferrous or ferric vanadate, and precipitation of "red cake" (a sodium polyvanadate) together with the yellow cake. (B14, U, V)

303-B. An Investigation Into the Removal of Arsenical Minerals From Broken Hill Gravity Concentrates. *Commonwealth Scientific and Industrial Research Organization and Kalgoorlie School of Mines*, Report 412, Nov. 3, 1950, 15 pages.

Results show that almost complete elimination of arsenical minerals can be made by suitably conditioning the material and by table flotation. (B14, As, Pb)

304-B. Tests to Determine a Method of Concentration of a Lead Dump, Baddera Lead Mine, Northampton, W. A. *Commonwealth Scientific and Industrial Organization and Kalgoorlie School of Mines*, Report 460, Dec. 19, 1950, 5 pages.

Data in tabular form. Methods used were tabling and jigging. (B14, Pb)

305-B. Recovery Tests on Gold-Copper Tailings From Paris Group (GML's 5311 and 5500, Coolgardie Goldfield) **Widgiemooltha, W. A.** *Commonwealth Scientific and Industrial Research Organization and Kalgoorlie School of Mines*, Report 478, Feb. 8, 1951, 6 pages.

Grinding, straking, and flotation tests were carried out on a combined bulk sample of the tailings to determine possible gold and copper recoveries. (B13, B14, Au, Cu)

306-B. Treatment of Manganous Slimes and Ores With Sulfur Dioxide. (In Russian.) V. M. Kakabadze. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 24, Mar. 1951, p. 252-263.

Influence of temperature, time, fineness of grinding, ratio of solid to liquid phases, and concentration and amount of SO_2 on the formation of $MnSO_4$ and MnS_2O_6 was experimentally investigated. Results and experimental installation. 49 ref. (B14, Mn)

307-B. Modern Hammer Mills for Size Reduction of Ores. (In Swedish.) E. Rothelius. *Jernkontorets Annaler*, v. 135, No. 6, 1951, p. 229-238.

Includes diagrams of modern hammer mills, performance curves, and tables. (B13)

C

NONFERROUS EXTRACTION AND REFINING

123-C. A Continuous Casting Machine for Brass Billets. *Machinery Lloyd* (Overseas Ed.), v. 23, Sept. 29, 1951, p. 115-116.

A British Commercial installation. (C5, Cu)

124-C. Societa Metallurgica Italiana: Copper and Brass Production at Fornaci di Barga. *Metal Industry*, v. 79, Oct. 5, 1951, p. 279-282.

Facilities and procedures of Italian plant. Includes foundry practice, electrolytic refining, rolling, wire-drawing, bar and tube making. (C23, E general, F general, Cu)

125-C. Industria Nazionale Alluminio; Electrolytic Reduction of Aluminium. *Metal Industry*, v. 79, Oct. 5, 1951, p. 285-286.

Facilities of an Italian plant. (C23, Al)

126-C. Societa Alluminio per Azioni Veneto; Aluminium Production at Porto Marghera. *Metal Industry*, v. 79, Oct. 5, 1951, p. 287-288.

Facilities of an Italian plant. (C23, Al)

127-C. Societa Italiana del Piombo e dello Zinco; Lead and Zinc Production. *Metal Industry*, v. 79, Oct. 5, 1951, p. 297-298.

Facilities of Italian electrolytic plant. (C23, Pb, Zn)

128-C. Recovery of Gold From Amalgamation Residues From the Maude and Yellow Girl Mine, Glen Wills, Vic. *Commonwealth Scientific and Industrial Research Organization and the Mining Department, University of Melbourne*, Investigation 336, Feb. 8, 1951, 7 pages.

A comparison is made between recovery by straight amalgamation with no grinding and amalgamation using sodium plumbite. (C29, Au)

129-C. Zinc Smelting and Refining. *Journal of the American Zinc Institute*, v. 29, 1951, p. 51-70.

Round-table discussion of economic and technological status and trends. (C21, A4, Zn)

130-C. Electric Furnace Smelting and High Temperature Chemistry.

Marvin J. Udy. *Journal of the Electrochemical Society,* v. 98, Nov. 1951, p. 158C-159C.

Previously abstracted from *Canadian Chemical Processing.* See item 110-C, 1951. (C21, D5)

131-C. Direct-Chill Casting of Aluminum Ingots. W. E. King. *Mechanical Engineering,* v. 73, Nov. 1951, p. 887-891.

Advantages and disadvantages of the above. Operation of the process and equipment used. (C5, Al)

132-C. The Distillation of Lithium Metal. Leo F. Epstein and W. H. Howland. *Science,* v. 114, Oct. 26, 1951, p. 443-444.

Use of glass system to purify Li on a laboratory scale. (C22, Li)

133-C. Aluminum Ingots. (In German.) B. Keysselitz. *Metall,* v. 5, Oct. 1951, p. 442-444.

Melting scrap aluminum and the compositions, properties, and specific uses of different Al alloys. (C21, A8, Al)

134-C. Experiments With Sintered Dolomite and Tar as Well as With Acid Tamping Clay as Furnace Linings for Smelting Copper in the Inclined Short Rotary Furnace (Ellipsoidal Furnace) **Fired With City Gas.** (In German.) Paul Klare. *Zeitschrift für Erzbergbau und Metallhuttenwesen,* v. 4, Sept. 1951, p. 338-340.

Results of comparative study with basic and acid furnace linings. (C21, Cu)

135-C. Physicochemical Problems in Thermal Production of Zinc and Their Practical Significance. (In German.) Kurt Hoffmann. *Zeitschrift für Erzbergbau und Metallhuttenwesen,* v. 4, Sept. 1951, p. 344-349.

Discusses Grothe's recent article in *Erzmetall,* v. 4, 1951. (See also item 65-C, 1951.) Disagrees with Grothe's theory of the mechanism of reduction of ZnO by carbon and CO, also with the idea that briquetting the charge promotes the reaction. 15 ref. (C21, Zn)

136-C. Japanese Plan to Produce Titanium. *Engineering and Mining Journal,* v. 152, Nov. 1951, p. 104.

Proposed flowsheet, using Japanese iron-sand deposits. Steps are: electric-furnace reduction, yielding Ti slag and pig iron; briquetting and sintering; chlorination; purification and distillation; Ti reduction with Mg; and vacuum distillation. (C26, C25, B16, B17, Ti)

137-C. (Book) **Die Metallurgie des Zinks.** (The Metallurgy of Zinc.) F. M. Loskutow. 296 pages. 1950. Verlag Wilhelm Knapp, Halle (Saale), Germany. (Translated from Russian to German by Fr. Krantz.)

The various methods of extracting Zn from its ores and refining it. Equipment and furnaces required in the extraction and processing of zinc; tables and graphs present results obtained by Soviet metallurgists. (C21, B general, Zn)

D

FERROUS REDUCTION AND REFINING

334-D. Oxygen Lancing in Electric Arc Steelmaking Furnaces. *Engineer,* v. 192, Oct. 5, 1951, p. 426-428.

Summarizes proceedings of recent British conference organized by British Iron and Steel Research Assoc. (D5, ST)

335-D. Open Hearth and Electric Furnace Refractories. James R. Cady. *Refractories Journal,* v. 27, Sept. 1951, p. 371-376.

Previously abstracted from *Blast Furnace and Steel Plant.* See item 210-D, 1951. (D2, D5, ST)

336-D. Use of Oxygen for Decarburizing Electric Furnace Steels. (In Italian.) Marcel Michaud. *Metallurgia Italiana,* v. 43, Aug. 1951, p. 315-322.

Advantages and methods for introduction of the oxygen into the furnace. Results obtained to date in making ordinary and special steels. Economics of the process. 12 ref. (D5, B22, ST)

337-D. Slag Materials and Slag Action in Basic Arc Furnaces. C. B. Post and D. G. Schoffstall. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 18-22; disc., p. 22-29.

Standard lime, fluorspar, and silica as slag-making materials in the basic electric-arc furnace. Requirements for reducing slag in the basic arc furnace. (D5, B21, ST)

338-D. Continuous Casting. Isaac Harter, Jr. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 31-42; disc., p. 42-48.

Developments and modern practices. Basic requirements for casting steel. (D9, ST)

339-D. Bottom Building and Maintenance. H. C. Bigge. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 49-67; disc., p. 67-69.

Methods used by several large producers of steel. Performance data on various furnace bottoms. (D5, ST)

340-D. Top Charging and High Voltages in Lining Life and Repair. R. J. McCurdy. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 70-71; disc., p. 71.

Factors involved. (D5, ST)

341-D. Types of Roof Construction. T. A. Blackwell. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 72-74; disc., p. 74-75.

See abstract of "Electric Furnace Roof Refractories", *Journal of Metals;* item 35-D, 1951. (D5)

342-D. Relining Electric Furnaces. C. F. Staley. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 76-77; disc., p. 77.

Procedures. (D5, ST)

343-D. Control of Refractory Materials. C. E. Sumpter. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 77-79; disc., p. 79.

Materials used in the various parts of a furnace, and methods of checking and controlling the quality. Results of recent trials at South Works, Carnegie-Illinois Steel Corp. (D5, ST)

344-D. Application of Resistance Indicator to Electric-Arc Furnaces. Alex Sherman. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 80-89; disc., p. 89-90.

Most electrical resistances present in the electric-arc furnace represent only a source of waste of energy. How to recognize and reduce this waste. A resistance-indicator apparatus and its advantages. (D5, ST)

345-D. Some Observations on the Metallurgy of Electric-Furnace Melting. C. R. Taylor. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 91-97; disc., p. 97-98.

Data on the inclusion content of steel are graphed. (D5, ST)

346-D. Practical Aspects of Toolsteel Melting. Charles F. Sawyer, Jr. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 98-100; disc., p. 100-103.

Previously abstracted from *Journal of Metals.* See item 325-D, 1950. (D5, ST)

347-D. Production of Alloy Steel in Large Basic Furnaces. A. K. Blough. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 104-109; disc., p. 109-111.

Previously abstracted from *Journal of Metals.* See item 24-D, 1951. (D5, AY)

348-D. Rimmed and Semikilled Steels. Paul Lindberg. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 112-113; disc., p. 113-115.

Practices used by McLouth Steel Corp. (D5, ST)

349-D. Induction Melting of Stainless Steels. R. J. Wilcox. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 115-118; disc., p. 118-119.

Use of induction furnaces in the production of special steels. Procedure for making an 18-8 (type 304) heat. (D5, SS)

350-D. Recent Trends in Stainless Melting Practice. A. C. Ogan. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 120-122; disc., p. 122-124.

Increased production; improving the quality of stainless; and pouring methods. (D5, SS)

351-D. Ore Practice in an Acid Electric Furnace. Frank J. Stanley. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 125-127; disc., p. 127-129.

As used by McConway and Torley Corp., Pittsburgh. Data were taken during the production of a series of 17 heats. (D5, ST)

352-D. Ore Practice in Making Acid Electric Steel. W. L. Doyle. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 130-131; disc., p. 131-134.

Practices used at Fort Pitt steel foundry at McKeesport, Pa. Data on heats are tabulated. (D5, ST)

353-D. Oxidation Period in Oxygen Injection in Melting Acid Electric Steel. R. H. Jacoby, M. Petty, and J. Mitchell. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 135-137; disc., p. 137-139.

Technique for carbon steel and alloy steels containing 1% Cr, 0.5% Mo; 2% Cr, 0.5% Mo; and 5% Cr, 0.5% Mo; respectively. (D5, CN, AY)

354-D. Oxygen Practice at Oklahoma Steel Castings Company. J. H. Garrison. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 140-143; disc., p. 143-148.

See abstract of "Oxygen in Acid Electric Steel Production," *Journal of Metals;* item 246-D, 1951. (D5, ST)

355-D. Investigation of New Special Deoxidizers. G. G. Mickelson. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 149-156; disc., p. 156-158.

Use of Se, Graphidox, Si-Mg-Al, and Na as deoxidizers for steel. Mechanical properties with and without deoxidizers. (D5, Q general, ST)

356-D. Effect of Various Types of Final Deoxidizers on Physical Properties of Class B Cast Steel. Clyde Wyman. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 159-172; disc., p. 172-174.

Purpose of investigation was to find a final deoxidizer that would produce a steel having the highest possible quality. Micrographs show results obtained with 10 types of deoxidizers. (D5, M27, Q general, ST)

357-D. Steels Deoxidized With Silicon. J. A. Bowers. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 174-179; disc., p. 180.

Effects of various additions. Mechanical properties are tabulated. (D5, Q general, ST)

358-D. Deoxidizing in the Ladle With Carbortam. W. O. Ingelman and D. A. Finch. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 180-185; disc., p. 185-190.

Previously abstracted from *Journal of Metals.* See item 326-D, 1950. (D5, B22, ST)

359-D. Rating Inclusion Structures in Cast Steels and Their Effects on Tensile Properties. Edward A. Loria. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 191-203; disc., p. 203-209.

A study on such deoxidizers as Ca-Si, SiC and Ca-Mn-Si, when used singly or in combination with Al.

The effect of these oxidizers on the nature and distribution of inclusions and the resultant tensile properties. (D5, M27, Q27, ST)

360-D. Production Control of Molten Steel Temperature and Its Effect on Steel Casting Quality. Charles A. Faist. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 210-228; disc., p. 228-244.

A relationship between temperatures of the bath and that of the test spoon of steel is shown to exist. Data on pouring and ladle preheat cycles. Some notes on proper temperature control equipment. (D9, S16, ST)

361-D. Residuals. J. S. Marsh. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 245-250.

Residuals are the elements ordinarily present in steel in small quantities without definite intent on the part of the steelmaker. Their behavior is discussed on a physical chemistry basis. Possible methods for removal or control. (D5, P12, ST)

362-D. Progress in Electric Steelmaking. C. F. Hood. *Electric Furnace Steel Conference, Proceedings,* v. 8, 1951, p. 253-260.

A survey. Uses of steels in various fields. (D5, T general, ST)

363-D. The Axial Compressor for Blast Furnace Blowing. W. O. Lowell. *Iron and Steel Engineer,* v. 28, Oct. 1951, p. 64-70.

Compared with the standard centrifugal blower. Advantages are an over-all efficiency improvement of 14-16%. (D1, Fe)

364-D. Low Sulphur Steel From High Sulphur Raw Materials and Fuel. F. L. Robertson, C. H. Bacon, and J. W. Till. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1031-1043; disc., p. 1043-1044.

Development of a process for making low-sulphur steel in furnaces fired with 2½% sulfur oil. Slag and metal are analyzed at melt. Slag weight is estimated. A simple method for calculating necessary lime additions for making 0.025 and 0.035% S steel is given. (D2, ST)

365-D. Effects of Manganese and Its Oxide on Desulphurization by Blast-Furnace Type Slags. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1048-1049.

Discussion of above paper (by Nicholas J. Grant, Ulf Kaling, and John Chipman). (Aug. 1951 issue, see item 248-D, 1951.) (D1, B21, CI)

366-D. Effect of Silica Reduction on the Desulphurizing Power of Blast-Furnace Type Slags. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1049-1050.

Discussion of above paper (by Nicholas J. Grant, Olaf Troili, and John Chipman). (Aug. 1951 issue, see item 249-D, 1951.) (D1, B21, CI)

367-D. Distribution of Sulphur Between Liquid Iron and Slags of Low Iron-Oxide Concentrations. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1050-1051.

Discussion of paper (by R. Rocca, N. J. Grant, and J. Chipman). (Apr. 1951 issue, see item 133-D, 1951.) (D general, Fe, ST)

368-D. Desulphurization of Pig Iron With Pulverized Lime; Kalling-Domnarfvet Process at Surahammar Works. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191. 1951, p. 1052-1053.

Discussion of above two papers (by Bo Kalling, C. Danielsson, and Ottar Dragge; and Sven Fornander, respectively.) (Sept. 1951 issue, see items 287-D and 288-D, 1951.) (D1, CI, Fe)

369-D. Solution Loss and Reducing Power of Blast Furnace Gas. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1053-1054.

Discussion of above paper (by T. L. Joseph). (Jan. 1951 issue, see item 25-D, 1951.) (D1, Fe)

370-D. Oxygen in Liquid Open-Hearth Steel—Oxidation During Tapping and Ladle Filling. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1054-1055.

Discussion of above paper (by T. E. Brower, J. W. Bain, and B. M. Larsen). (June 1950 issue, see item 183-D, 1950.) (D2, D9, ST)

371-D. Metals for the West: Big Steel in the Mountains. R. G. Paul. *Western Machinery and Steel World,* v. 42, Oct. 1951, p. 94-97.

U. S. Steel's Geneva steel mill near Provo, Utah. Coke plant, blast furnaces, openhearths, and rolling mills. (D general, F23, ST)

372-D. Carbon, Phosphorus and Sulfur Distribution in a Rimming Open-hearth Steel Ingot, Containing 0.15% Carbon. (In Czech.) Vaclav Rauner. *Hutnické Listy,* v. 6, Aug. 1951, p. 376-380.

The chemical composition difference between an average melt sample and finished-product samples at various points of a semiduplex open-hearth rimming steel ingot containing 0.15% C and cast into square, hot-topped, big-end-up and normal molds. The range and the scatter value should be considered in all cases where a high degree of homogeneity is required in order to determine the most suitable ingot portion for production of serviceable product. (D9, D2, ST)

373-D. Discussion of the Problem of Constructing an Openhearth Furnace for a Special Case. (In French.) *Circulaire d'Informations Techniques,* No. 9, 1951, p. 1037-1041.

A furnace of 75-100 tons capacity is proposed. Construction details, such as dimensions, burners, flues, chambers, and stacks. (D2, ST)

374-D. Modern Auxiliary Equipment for the Openhearth. (In French.) M. Labat. *Circulaire d'Informations Techniques,* No. 9, 1951, p. 1046-1051.

New types of reversing valves, cooled furnace doors, burners, charging equipment, etc. (D2, ST)

375-D. Ways of Using the Burners on Openhearth Furnaces. (In French.) M. Godenne. *Circulaire d'Informations Techniques,* No. 9, 1951, p. 1052-1056.

Possibilities for avoiding the attack of basic dust on the masonry separating the air duct from the gas duct. Silica and silica-magnesia burners; also the Maerz and Leckie-Maerz furnaces, the latter incorporating important modifications for elimination of dust difficulties. (D2, ST)

376-D. Regulation of Basic Bessemer Converters With Constant Air Flow. (In French.) Paul Thierry. *Revue de Métallurgie,* v. 48, Aug. 1951, p. 619-629; disc., p. 630.

Desirable properties of steel from converters; conditions necessary to produce such cast iron; and regulation of the converter for optimum results. (D3, ST)

377-D. The Slag-Reaction Process for Producing Steel by the Openhearth Process. (In German.) Edgar Spetzler. *Archiv für das Eisenhüttenwesen,* v. 22, July-Aug. 1951, p. 197-204.

Individual examples show the different possibilities of producing substitutes for electric furnace steels with the aid of slag reduction in the openhearth furnace. 15 ref. (D2, ST)

378-D. Large-Scale Method of Raising Output in Electric Steel Foundries. (In German.) W. Trommer. *Giesserei,* v. 38 (new ser., v. 4), Sept. 6, 1951, p. 422-426.

Experiments made in a 3-ton electric arc furnace show that the output can be increased 1.6 times by increasing the charge. By changing the dimensions of the hearth chamber, current and electrode consumption can be reduced. However, increase in output above 1.34 times reduces the quality of the steel. 11 ref. (D5, ST)

379-D. Desulfurization in the Cupola and in Electric Furnaces. (In German.) C. W. Pfannenschmidt. *Giesserei,* v. 38 (new ser., v. 4), Sept. 20, 1951, p. 459-469.

General methods of desulfurizing molten cast iron, such as by using basic linings, suitable slags, or by addition of Mn compounds or alloys. Various improved desulfurizing methods. (D5, E10, CI)

380-D. Heat Losses in Steel Mills by Type, Quantity, and Importance. (In German.) Kurt E. Poppe. *Stahl und Eisen,* v. 71, July 19, 1951, p. 769-773.

Tabular analyses for openhearths, gas producers, heating ovens, etc. Includes economic analysis and recommendations for minimizing such losses. (D general, ST)

381-D. Determination of Coke Consumption of Blast Furnaces. (In German.) Friedrich Wesemann. *Stahl und Eisen,* v. 71, Aug. 16, 1951, p. 873-877.

A simplified method of determination. The mathematical process is clarified by tables and graphs. (D1, Fe)

382-D. Results of Blast-Furnace Operation Using a Low Charge Level of Fine-Grained Material. (In German.) Wilhelm Wolf. *Stahl und Eisen,* v. 71, Aug. 30, 1951, p. 922-925.

How the difficulties of smelting low-grade ore are overcome by diminishing the size of the furnace charge. (D1, Fe)

383-D. Flow and Thermotechnical Evaluation of Blast-Furnace Stoves. (In German.) Michael Hansen. *Stahl und Eisen,* v. 71, Aug. 30, 1951, p. 941-946.

Comprehensive analysis of design factors, including checkerwork, hood space, combustion chamber, and burner design. (D1)

384-D. Principles of Desulfurization in the Production of Basic Openhearth Steels. (In German.) Friedrich Harders, Hubert Grewe, and Willy Oelsen. *Stahl und Eisen,* v. 71, Sept. 13, 1951, p. 973-985; disc., p. 985-986.

Plant and laboratory experiments made on 25 melts. Factors that determine the S content of the steel. 16 ref. (D2, ST)

385-D. Blast-Furnace Observations With a Measuring "Sword". (In German.) Wilhelm Wolf. *Stahl und Eisen,* v. 71, Sept. 13, 1951, p. 986-991.

Apparatus and procedure for recording simultaneously both temperature and gas composition across the furnace. Charted results point to important conclusions concerning cause of the scaffolding phenomenon, and concerning furnace and charge-distribution design. (D1, S16, S18, Fe)

386-D. Determination of the Chemical Effect of Carbon in Molten Iron. (In German.) Wilhelm Wenmann and Theo Kootz. *Stahl und Eisen,* v. 71, Sept. 13, 1951, p. 992-994; disc., p. 994.

Experiments show that the oxide films formed on the surface of molten pig iron disappear at and above the ignition temperature of carbon and that increasing C content lowers, while increasing Si content raises, this ignition point. 11 ref. (D1, Fe)

387-D. Performance Data on Electric Furnaces Melting Basic Bessemer Steel. (In German.) Friedrich Badenheuer and Hans Schweiger. *Stahl und Eisen,* v. 71, Sept. 27, 1951, p. 1029-1035.

Results of a study of large electric-arc furnaces in each of 12 mills for a period of one month. As a result considerable increases in output rate were achieved. Use of a "stirring coil" was found to be the most promising method of further reducing the refining time. 20 ref. (D5, ST)

388-D. Specific Charge Rates of Blast Furnaces of Different Capacity. (In German.) Wilhelm Wolf. *Stahl und Eisen,* v. 71, Sept. 27, 1951, p. 1035-1037.

In a German plant, it was found that increasing the coke charge rate increases the coke consumption per ton of pig iron. Comparative data from different countries indicate a drop in hearth charge with increasing hearth diameter. (D1, Fe)

389-D. Alloys With Sulfur in Metallurgy, Metallography, and Cosmic Physics. (In German.) Rudolf Vogel. *Zeitschrift für Metallkunde,* v. 42, July 1951, p. 202-206.

Several examples explain the importance of research on equilibria between metal and rock to production of sulfur-containing steels, to explanation of meteorite structure, and to determination of composition of stellar matter. (D general, ST)

390-D. Diffusion Deoxidation With Coke in the Basic Openhearth Furnace. (In Polish.) K. Radzwicke and J. Kozielski. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 4, 1951, p. 267-277.

Mechanical properties of openhearth steel are said to be inferior to those of electric-furnace steels because of greater content of oxygen and nonmetallic inclusions. Application of diffusion deoxidation with coke to eliminate the difference in quality. Other advantages. (D2, ST)

391-D. Influence of Productive Factors on Properties of Transformer Sheets Rolled at High Temperatures. (In Polish.) M. Markuszewica and J. Kozielski. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 4, 1951, p. 279-295.

Reviews present opinions concerning influence of chemical composition, structure, and tension on magnetic properties. Results of application of different melting methods to 35 melts. Optimum procedures for melting and heat treatment. Typical structures are illustrated. 22 ref. (D general, F23, P16, SG-p)

392-D. Sintering of Iron Ores and Production of Bessemer Steel With Vegetable Charcoals in Brazil. (In Portuguese.) Jayme Benedito de Araujo. *Engenharia, Mineracao e Metalurgia,* v. 16, May-June 1951, p. 19-21.

Investigation of the mineral content of charcoals from various parts of Brazil and their application in the production of bessemer steel. (D3, B16, ST)

393-D. Low-Shaft Iron Smelting Furnaces. D. J. O. Brandt. *Coke and Gas,* v. 13, Oct. 1951, p. 351-356, 364.

The latest developments in the production of pig iron with fuels other than metallurgical coke. (D1, Fe)

394-D. Trends of Iron and Steelmaking Processes. (In Swedish.) Bo Kalling. *Jernkontorets Annaler,* v. 135, No. 7, 1951, p. 241-284, disc., p. 285-286.

On the basis of a survey of progress of iron and steelmaking processes during the past 10-15 years, an attempt is made to forecast future developments. 14 ref. (D general, Fe, ST)

395-D. (Book) **Austenitic Grain-Size Control of Steel.** B. R. Nijhawan and A. B. Chatterjee. 58 pages. 1951, Council of Scientific & Industrial Research, New Delhi, India. Rs 3.

A comparative study of methods for revealing the mechanism of grain-size control. Properties of a large number of commercial steels of foreign and Indian make were studied and correlated with grain-size. (D general, M27, ST)

396-D. (Book) **Elektrometallurgiya; Obshchii Kurs.** (Electrometallurgy; General Course.) F. P. Edneral. 552 pages. 1950. State Scientific-Technical Publishing House for Literature on Ferrous and Nonferrous Metallurgy, Moscow, U S.S.R.

Equipment and procedures for electric steelmaking. The last section covers production of ferro-alloys in general and specifically for each type. 118 ref. (D5, B22, ST, Fe-n)

E

FOUNDRY

567-E. Producing Leak-Proof Aluminum Castings. E. M. Hunt. *Foundry,* v. 79, Nov. 1951, p. 96-97, 218-219.

Recommended procedures for minimizing porosity. (E25, Al)

568-E. Developing a Pilot Foundry. Carl B. Stone. *Foundry,* v. 79, Nov. 1951, p. 98-100. [Reprinted from *Iron Worker* (Lynchburg Foundry Co.)]

Experimental foundry of Lynchburg Foundry Co., Lynchburg, Va. (E general, A9)

569-E. Studebaker Doubles Foundry Capacity. (Concluded.) Ray H. Moore. *Foundry,* v. 79, Nov. 1951, p. 102-107, 214-216.

Details of handling equipment and procedures following shakeout. (E24)

570-E. Precision Casting of Heat-Resistant Alloys at Allis-Chalmers. *Industrial Heating,* v. 18, Oct. 1951, p. 1810-1812, 1814, 1816, 1818, 1820, 1822, 1915-1916.

Equipment and procedures for the "lost wax" process. (E15, SG-h)

571-E. The Nucleation of Cast Metals at the Mould Face. J. A. Reynolds and C. R. Tottle. *Journal of the Institute of Metals,* v. 80, Oct. 1951, p. 93-98.

Nucleation effected by applying metal powders to the face of a standard mold was investigated by comparing grain-size of ingot surfaces produced with and without the coating. In general, powdered metals having the same crystallographic form as the metal being cast are effective as nucleating agents, provided that the degree of lattice "misfit" does not exceed 5%, or in some cases 10%. This simple mechanism was found to apply to the solidification of Sn, Pb, Zn, Sb, Al, Mg, and Cu. 16 ref. (E25, N2, Sn, Pb, Zn, Sb, Al, Mg, Cu)

572-E. Cellini Showed Us How to Precision-Cast High Alloys. G. A. Hanke, Jr. *Steel Horizons,* v. 13, Fall 1951, p. 12-13.

Present-day equipment and procedures of lost-wax process. The same principles were used by sculptor and metal worker Benevuto Cellini in the 16th century. (E15)

573-E. Proposal for a Standard Classification of Casting Defects. (In Czech.) Adolf M. Plesinger. *Hutnické Listy,* v. 6, June 1951, p. 262-270.

Details of system, use of which should result in improved foundry practice. Includes extensive tables. 15 ref. (E25)

574-E. Improvement of Synthetic Argillaceous Sands. (In French.) Pierre Nicolas. *Fonderie,* June 1951, p. 2503-2512.

Influence of the shape of the sand grains, the suitability of various colloidal clays found in France, thermal reactions of synthetic sands, modification of properties brought about by adding carbon black and results obtained when using a humidity regulator. (E18)

575-E. The Manufacture of Multiple Grooved Pulleys. (In French.) Francois Simorre. *Fonderie,* June 1951, p. 2513-2520.

Discusses an article by N. A. Birch in *American Foundryman,* Jan. 1950 (see item 34-E, 1950). Production of various pieces and schematic drawings. (E22, CI)

576-E. Guide for Choice, Construction, and Operation of Core-Drying Ovens. (In French.) *Fonderie,* June 1951, p. 2521-2535.

Elements of construction of ovens, and operation of various types. Numerous schematic diagrams. (E21)

577-E. Graphite and Its Applications in Foundry Practice. (In French.) Charles Dennery and Francois Pensa. *Fonderie,* July 1951, p. 2547-2564.

Characterization of graphite, modes of formation, production of graphite products; physical and chemical properties of synthetic graphite; utilization of its refractory properties; carburization of steels and cast iron; and other applications. (E general, C-a, CI)

578-E. Growth of Cast Iron; Application to Study of Ingot Molds. (In French.) Paul Rocquet and Michel Olette. *Fonderie,* July 1951, p. 2565-2577.

Describes experiments. Factors hitherto neglected, such as graphitization, deformation due to volume variation when passing the transformation point, and oxidation are considered. 10 ref. (E25, D9, CI)

579-E. Defects in Steel Castings. (In Italian.) Giacomo Ferrero and Giuseppe Ziliani. *Metallurgia Italiana,* v. 43, Aug. 1951, p. 323-332.

Divides defects into two types—those due to metallurgical factors and those due to poor foundry practice. Causes of the various types and their avoidance. 35 ref. (E25, CI)

580-E. The Process of Die-Casting. J. A. de Kiewiet. *Foundry Trade Journal,* v. 91, Oct. 11, 1951, p. 413-418, 422.

Principal materials, techniques and practices, and construction of dies. Composition of some nonferrous alloys used. (E13, EG-a)

581-E. Casting Soundness Can Be Controlled. *Steel,* v. 129, Nov. 12, 1951, p. 81-82.

Design and materials engineers, working closely with foundry technicians, can reduce shrinks and general porosity in castings, saving time, labor, and materials and eliminating the hazards of using defective castings. (E25, CI)

582-E. Centrifugal Steel Casting in Permanent Molds. Part II. John Osborn Felt. *Tool Engineer,* v. 27, Nov. 1951, p. 47-48, 54.

How flanged rings or bushings can be cast by the above method. Applications in the production of jet-engine components. (E14, CI)

583-E. Production of Chill Molds. (In German.) E. Feil. *Giesserei,* v. 38 (new ser., v. 4), July 26, 1951, p. 345-355.

Reasons for the limited life of chill molds were investigated. Structure, hardness, and segregation of sulfides greatly affect their durability. Other important factors are Si, P, and Mn content, and casting temperature. (E12, CI)

584-E. Molding Sands and Patterns in the High-Grade Steel Foundry. (In German.) W. Sauermann. *Giesserei,* v. 38 (new ser., v. 4), July 26, 1951, p. 360-362.

Tables, photographs, and diagrams supplement a general discussion. (E18, E17, CI)

585-E. Centrifugal Casting. (In German.) E. Englisch. *Giesserei,* v. 38,

(new ser., v. 4), Aug. 9, 1951, p. 369-373.
Optimum conditions for centrifugal casting of different kinds of ferrous and nonferrous metals. (E14)

586-E. Cast Structural Parts. (In German.) H. Stein, W. Rave, and H. Picard. *Giesserei*, v. 38, (new ser., v. 4), Aug. 9, 1951, p. 373-374; disc., p. 374-375.
Design of pouring and gating systems. (E22, E23, CI)

587-E. Development and Experiences With Hot-Blast Cupola Furnaces. (In German.) K. Roesch. *Giesserei*, v. 38, (new ser., v. 4), Aug. 23, 1951, p. 393-397.
Properties, designs, and operation of different blast heaters. Output, optimum blast temperature, metallurgical effect, and economy of hot-blast cupolas. (E10, CI)

588-E. Refining, Degassing, Desulfurizing, and Pipe-Prevention Agents for Nonferrous Metals, Cast Iron, and Cast Steel. (In German.) E. Piwowarsky. *Giesserei*, v. 38 (new ser., v. 4), Sept. 6, 1951, p. 417-422.
Discussion of published practices and experimental results. Refining high-Mg alloys with gray-iron chips and the application of exothermic mixtures in which part of the iron oxides are replaced by copper oxides. Data are tabulated. (E25)

589-E. Advances in Foundry Practice in the Second Half of 1950. (In German.) Paul A. Heller. *Stahl und Eisen*, v. 71, Sept. 13, 1951, p. 1011-1014; Sept. 27, 1951, p. 1058-1063.
Review of literature. 81 ref. (E general)

590-E. Gates and Heads for Steel Castings. John Howe Hall. *Foundry*, v. 79, Nov. 1951, p. 108-109, 236, 238, 240, 242, 244, 246, 248.
The fundamentals involved in designing gating systems and feeding heads employed in the production of steel castings. (First of a series. To be continued.) (E22, CI)

591-E. How to Use the Cupola. Bernard P. Mulcahy. *Foundry*, v. 79, Nov. 1951, p. 250, 252-253.
Fluxing the cupola melt, and the importance of a reliable temperature log of the heat. (11th article of series. To be continued.) (E10, CI)

592-E. Die Casting Die Design. Part V. H. K. Barton and James L. Erickson. *Magazine of Tooling and Production*, v. 17, Nov. 1951, p. 52-53, 76, 84.
"Overflows" — separated cavities cut into the face of die-casting dies adjacent to the main cavity and connected to it by means of a channel which permits molten alloy to flow into it directly from the main die cavity as the latter fills. (To be continued.) (E13)

593-E. Investment Casting. G. A. Tomkinson. *Metal Industry*, v. 79, Oct. 12, 1951, p. 315-318; Oct. 19, 1951, p. 335-338.
The process and its applications. (E15)

594-E. Saving up to 84 Per Cent on Gears, Pawls and Special Shapes by Investment Casting and Powder Metallurgy. *Precision Metal Molding*, v. 9, Nov. 1951, p. 36-38, 60.
Parts used in addressograph and multigraph equipment. Table shows old and new methods and cost savings for specific parts. Materials are Cu and Fe powders and SAE 1117 steel.
(E15, H general, T10, Cu, Fe, AY)

595-E. Flexure Under Load Is Overcome With a Rigid Frame by Permanent Mold Casting. Bruce Adams. *Precision Metal Molding*, v. 9, Nov. 1951, p. 32-33, 62-64.
Used in connection with design of small scales. Material is Al alloy. (E12, T8, Al)

596-E. Provision for Resisting Operating Stresses in Die Casting Dies. H. K. Barton. *Machinery* (London), v. 79, Oct. 25, 1951, p. 729-736.
Details of design principles. (E13, T5)

597-E. Critical Observations on Standard Methods for Testing of Molding Sands. (In German.) W. Gotz. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 17, Aug. 1951, p. 225-248; disc., p. 249-251.
The property requirements and most important testing methods for molding sands. 24 ref. (E18)

598-E. Cupola Refractories. (In Swedish.) Erik O. Lissell. *Gjuteriet*, v. 41, Mar. 1951, p. 35-43.
The attack of fuel, metal, and slag on the various parts of the furnace. Choice of refractory materials. Special attention is given to the combustion zone where the burn-out is most severe. Factors governing the degree and shape of burn-out and suggestions for minimizing erosion. Composition and properties of patching materials. 17 ref. (E10)

599-E. Preheating of the Cupola Blast. (In Swedish.) W. von Preen. *Gjuteriet*, v. 41, Aug. 1951, p. 117-121.
The theory of hot-blast cupolas on the basis of Piwowarsky's statements. The blast may be preheated in a separately fired air heater or with the aid of waste gases from the cupola. Heat-flow diagrams show how the hot blast changes thermal conditions in the cupola. Advantages and disadvantages. 10 ref. (E10, CI)

F
PRIMARY MECHANICAL WORKING

274-F. Rolls and Rolling. Part XXIX. Tees. E. E. Brayshaw. *Blast Furnace and Steel Plant*, v. 39, Oct. 1951, p. 1224-1234.
A series of diagrams shows design features of roll passes for tee sections. (F23)

275-F. Recent Experiences in Copper Wire Drawing. (Concluded.) W. Hodgkins. *Industrial Diamond Review*, v. 11, June 1951, p. 134-135.
Use of the Syncro B16 machine for reduction of Cu wire 0.064-0.044 in. in diam. to 0.012-0.0076 in. Includes cost data. (F28, Cu)

276-F. Fundamentals of the Working of Metals. Part XXVII. Continuous Forming Processes. George Sachs. *Modern Industrial Press*, v. 13, Oct. 1951, p. 20, 22.
Continuous wire and tube drawing, continuous rolling, and roll forming. Schematic diagrams. (F23, F26, F28, G11)

277-F. Wire Drawing by Means of Tandem Wire-Drawing Equipment. (In Polish.) M. Schneider. *Prace Glownego Instytutu Metalurgii*, v. 3, No. 3, 1951, p. 233-240.
Theoretical, mathematical analysis clarified by diagrams. (F28)

278-F. Some Aspects of Soaking Pit Operation. F. H. Graham. *Iron and Steel Engineer*, v. 28, Oct. 1951, p. 78-84; disc., p. 84.
Points that may be helpful in obtaining good soaking-pit operation. The first step is good soaking-pit design for the particular situation. (F21, ST)

279-F. Some New Rolling Mills in the United Kingdom. The New 42-In. Slabbing Mill at Shotton. J. F. R. Jones. **New Blooming and Billet Mills at Normandy Park Steel Works of John Lysaght's Scunthorpe Works, Ltd.** J. A. Peacock. **Rod and Bar Mill at Guest Keen and Nettlefolds, Ltd., Cardiff.** G. A. Phipps. **Light Section Mill at Darlington and Simpson Rolling Mill Co., Ltd.** W. French. *Iron and Steel Engineer*, v. 28, Oct. 1951, p. 93-104.
Diagrams, illustrations and tables. (F23, ST)

280-F. Forging and Related Operations at the Buick Plant. Philip H. Flynn and William A. Koppi. *Metal Treatment and Drop Forging*, v. 18, Oct. 1951, p. 433-439.
Emphasis on variations from other U. S. plants. Steel compositions, metallurgical control, heat treatment, inspection, scale removal, pickling, and forging-die practice. (F22, A5, CN, AY)

281-F. Steel Warehouse Installs Cold Reduction Strip Mill. *Steel*, v. 129, Nov. 12, 1951, p. 90, 92.
The layout of Korhummel, Heffron & Preiss Steel Co. for pickling, rolling, annealing, and slitting flat rolled steel. (F23, ST)

282-F. Rapid Reversal Technique Application for Rolling Mills. J. Rabinow. *Steel*, v. 129, Nov. 12, 1951, p. 97-98.
A high-speed device that can be used in the rolling mill. (F23)

283-F. Increasing Drop Forging Die Life. Part VIII. "Rougher and Finisher". John Mueller. *Steel Processing*, v. 37, Oct. 1951, p. 509-510.
Final forging operations. (F22, ST)

284-F. Straight-Line Production of Pipe. *Welding Engineer*, v. 36, Nov. 1951, p. 48-50.
Roll forming and resistance welding of steel pipe at Kaiser Steel Corp.'s Fontana, Calif., mill. (F26, CN)

285-F. Intensive Cultivation of a Specialized Field Pays Off. James E. Lewis. *Western Metals*, v. 9, Oct. 1951, p. 28-30.
Growth of cold rolled steel strip production in California Cold Rolled Steel Corp. (F23, ST)

286-F. Ryan Improves Drop Hammer Methods by Adopting Ideas of the Men-on-the-Machines. *Western Metals*, v. 9, Oct. 1951, p. 34-35.
Various ideas adopted for improving methods in the drop-hammer department. (F22)

287-F. New Sheet Metal Rolling Mill of S. A. Metallurgique d'Esperence-Longdoz. (In French.) F. de Bassompierre. *L'Ossature Metallique*, v. 16, Oct. 1951, p. 466-472.
Belgian mill is said to be the first to manufacture broad rolled sheet steel in a continuous process on the European continent. (F23, ST)

288-F. Deformation Process, Effect of Calibration, and Cladding in the Rolling Mill in the Mannesmann Process. (In German.) Werner Scheurer, Paul Gruner, and Anton Pomp. *Stahl und Eisen*, v. 71, July 19, 1951, p. 760-768.
Reviews literature. Experiments were made to establish optimum conditions for making steel tubes by the Mannesmann process, both plain and those to which a corrosion resistant layer is applied to both inside and outside of the tubes, an intimate bond being achieved by a combination of pressure and temperature. (F26, L22, ST)

289-F. Effect of Die Contour on Stress Distribution and Critical Deformations in Wire Drawing. (In German.) Erich Siebel. *Stahl und Eisen*, v. 71, Aug. 2, 1951, p. 801-803; disc., p. 803-805.
Theoretical study to determine effect of the shape and area reductions on average tensile stress of low-carbon steel wire. An example explains required conditions for drawing. (F28, CN)

290-F. Drive Efficiency in Multiple-Bar Drawing. (In German.) Fritz Boehm. *Stahl und Eisen*, v. 71, Aug. 2, 1951, p. 817-826.
Measurements on the simultaneous drawing of 1-10 carbon-steel bars

established an optimum drawing rate and showed a considerable saving in energy with increasing number of bars. (F27, ST)

291-F. Keeping the Rolls Clean on Rolling Stands for Hot Rolling Thin Sheet Metal. (In German.) Wilhelm Kramer. *Stahl und Eisen*, v. 71, Aug. 16, 1951, p. 878-880.

Causes of iron deposits on rolls and devices designed to remove these deposits. (F23, ST)

292-F. AIA Looks to Future Use of Titanium. Alexander McSurely. *Aviation Week*, v. 55, Nov. 12, 1951, p. 34, 36, 40.

Manufacturing method projects recommended by Aircraft Industries Association for Air Materiel Command sponsorship. Miscellaneous primary and secondary fabrication processes and welding operations are included.
(F general, G general, K general, Ti)

293-F. Improved Producibility Through Extrusion. *Machine Design*, v. 23, Nov. 1951, p. 139-141.

Equipment and procedures of new mass-production method for hot extruding one-piece, hollow-steel propeller blades for high-speed combat and commercial aircraft. Strength-weight ratio and quality improvements accompany production-time savings. (F24, ST)

294-F. Cold Rolling of Steel Strip. (In Swedish.) Carl Sebardt. *Jernkontorets Annaler*, v. 135, No. 7, 1951, p. 287-384, disc., p. 384-402.

Both theoretical and practical aspects of cold rolling. General review of cold rolling as applied to strip as well as of different methods for practical calculations. Material properties in relation to degree of reduction and number of passes; also tolerances and surface defects. Furnace and other devices used in pickling, annealing, rolling, cutting, inspection, etc. Some economic questions and the position of cold rolling in Sweden.
(F23, J23, L12, S13, ST)

G

SECONDARY MECHANICAL WORKING

366-G. Super-Finishing Bronze and Brass. V. K. Nikitin. *Industrial Diamond Review*, new ser., v. 11, Mar. 1951, p. 73-74. [Translated from *Stanki i Instrument* (Machine Tools and Equipment), v. 20, Sept. 1949, p. 16-17.]

Superfinishing has hitherto been limited mainly to iron and steel. Experiments were made to ascertain the possibilities of superfinishing surfaces of softer metals. (G19, Cu)

367-G. Machining Metals at High Temperatures. J. Lomas. *Machinery Lloyd* (Overseas Ed.), v. 23, Sept. 29, 1951, p.80-81, 83.
(G17)

368-G. Cash Boxes Press Engineered. Howard E. Jackson. *Modern Industrial Press*, v. 13, Oct. 1951, p. 13-14, 16, 22.

Procedures and equipment for manufacture of cash boxes. Press operations, spot welding, cleaning, and finishing. Material is cold-rolled steel. (G1, K3, L general, CN)

369-G. Cutting Carbides in a Brand-New Way. *Modern Industry*, v. 22, Oct. 15, 1951, p. 101.

New "electromechanical" process for working materials like tungsten and boron carbides, zirconium boride, and alloys used to make jet-engine turbine blades. The method "cuts" by means of an accurately controlled spark discharge, but it does not melt the metal. As a matter of fact, the work and tool (electrode) hardly heat up at all. Rather, the metal is dispersed as a cloud of fine particles. (G17, C-n, SG-j)

370-G. Titanium Machines Like Jet-Engine Alloys. *Steel*, v. 129, Oct. 22, 1951, p. 74-77.

Based on concluding section of Air Force machinability report just published by Curtiss-Wright. Summarizes machinability data obtained by several cooperating organizations. (G17, Ti)

371-G. Maintenance and Improvement of Quality Cold Heading Wire. Lester R. Franks and John C. Harrigan. *Wire and Wire Products*, v. 26, Oct. 1951, p. 888-891, 894-895, 898, 998.

Recommended procedures. Several simple rules for successful application of the cold heading process are clarified by schematic diagrams. Macrostructures of properly and improperly headed bolts. Grades of carbon steel used for the different types of products. Typical products. (G10, T7, CN)

372-G. Tungsten and Molybdenum as High Speed Steel Tool Materials. Part 2. Molybdenum, Tungsten/Molybdenum and Cast Chromium Tungsten High Speed Steels. K. J. B. Wolfe. *Alloy Metals Review*, v. 8, Sept. 1951, p. 2-7.

Salient qualities of the straight Mo, the W-Mo and the cast Cr-W high-speed steels. Heat treatment recommendations. Appraisal of the first two types of steels was attempted by the use of drilling tests while milling tests were used to evaluate the cutting properties of the cast Cr-W types.
(G17, J general, T6, TS)

373-G. How to Machine Copper Alloys. Lester F. Spencer. *American Machinist*, v. 95, Oct. 29, 1951, p. 109-123.

Special report divides the various alloys into three major groups, according to their machinability ratings. Specific recommendations for each group. Feeds, speeds and tool cutting angles for the common machine operations. Typical uses.
(G17, Cu)

374-G. How Douglas Stretch-Forms Titanium. *American Machinist*, v. 95, Oct. 29, 1951, p. 124. (Condensed from paper by O. A. Wheelon.)

Process as applied to a new project at Douglas Aircraft Co. Weight was extremely critical and titanium, despite its high cost, was the most economical method for saving approximately 5% of the total structural weight. Recommended stretch-forming procedures. (G9, Ti)

375-G. Powder Processes Give New Tools to Industry. A. B. Kinzel, D. Swan, H. Biers, and H. R. Pufahl. *Canadian Metals*, v. 14, Oct. 1951, p. 10-12, 14.

Powder process for cutting nonferrous metals, cast iron, and refractory materials; and for reclamation of castings. (G22, EG-a, CI)

376-G. Deep Drawing of Aluminum. L. W. Lengbridge. *Canadian Metals*, v. 14, Oct. 1951, p. 52-54, 56, 58.

Various processes used. Factors which play a part in drawing operations. (G4, Al)

377-G. High Temperature — High Pressure Piping. W. S. Woolsey. *Heating, Piping & Air Conditioning*, v. 23, Nov. 1951, p. 77-81.

Fabrication of a heavy-wall, 2¼% Cr, 1% Mo pipe. Welding procedures and methods of stress relieving.
(G6, K general, J1, AY)

378-G. A New Method of Machining. John S. Roller. *Iron and Steel Engineer*, v. 28, Oct. 1951, p. 133, 135.

A new method which employs the direct utilization of electrical energy for the machining of any electrically conductive material. The method (known as "Method X") in a directed manner by means of an electric spark discharge which does not otherwise affect the work material's physical or chemical characteristics. (G17)

379-G. Bearings, Lubricants, and Lubrication; A Digest of 1950 Literature. *Mechanical Engineering*, v. 73, Nov. 1951, p. 892-896.

A literature survey. The role of lubrication in grinding metals is included. Frictional wear of metals. 72 ref. (G18, Q9)

380-G. Thermal Distortion, Deflection and Vibration in Machine Tools. Part II. Max Kronenberg. *Modern Machine Shop*, v. 24, Nov. 1951, p. 122-124, 126, 129-130, 132, 134, 136.

Differentiates between lateral and torsional vibrations. Forced and self-excited vibrations with emphasis on an analysis of their sources and causes. (G17)

381-G. Powder Cutting Handles Stainless With Ease. *Steel*, v. 129, Nov. 5, 1951, p. 94-96.

Problem of fluxing and removing the refractory oxide formed in cutting Cr-bearing steels is solved by adding Fe powder to the oxygen atmosphere. Other applications of powder cutting are in nonferrous metals, cast iron, and carbon steel.
(G22, SS)

382-G. What to Do About Wrinkled Stampings; Clips Improve Guerin Process. Thomas A. Dickinson. *Steel Processing*, v. 37, Oct. 1951, p. 499-500, 533.

Procedures followed by North American Aviation. Diagrams show set-ups using sheetmetal clips to equalize forming pressures. (G8)

383-G. Mullins Develops New Cold Extrusion Process. *Steel Processing*, v. 37, Oct. 1951, p. 505, 519.

The process called Koldflo will coin, extrude forward and backward, compress, expand, and iron.
(G5, ST)

384-G. Comparison of Progressive and Single-Station Dies. R. J. Schimpf. *Tool Engineer*, v. 27, Nov. 1951, p. 33-35.

Advantages and disadvantages. Discussion is limited to production of rotor and stator laminations for a ¼-hp motor. (G2)

385-G. Experimental Measurement of Cutting Forces and Speeds. Part II. J. B. Armitage and A. O. Schmidt. *Tool Engineer*, v. 27, Nov. 1951, p. 50-54.

There is no single, definite value of cutting speed and feed for a particular material. Experimental investigations on cutting low-alloy steel with carbide tools develops principles that are generally applicable. 24 ref. (G17)

386-G. The Technological Mechanics of Deep Drawing. (In German.) Hans Kostron. *Archiv für das Eisenhüttenwesen*, v. 22, July-Aug. 1951, p. 205-213.

Mathematical treatise dealing with the geometry of the deep-drawing process; computing local deformations; the flow curve; flow conditions; computing contracting stresses; spatial state of stress in deep drawing; the law of form change; limiting drawing conditions; and premature contraction. (G4)

387-G. Research on a New Hot Deep-Drawing Process. (In German.) Dieter Lenz. *Archiv für das Eisenhüttenwesen*, v. 22, July-Aug. 1951, p. 215-224.

Process for cupping of round sheet-metal discs. Optimum drawing conditions were investigated experimentally for a 99.5% Al and a series of Al alloys. Photographs of equipment, dies, and products. (G4, Al)

388-G. Powder Flame Cutting. (In German.) L. Wolfe. *Schweissen und Schneiden*, v. 3, Aug. 1951, p. 256-260.

Equipment used with iron powder. Several examples show that the process can be used where the oxygen flame cutting process fails. It is applied, especially, to the cutting of

stainless steels, cast iron, and pieces of steel and iron that contain slag and cavities. (G22, SS, CI)

389-G. The Problem of Internal Stresses Due to Cold Working and Their Reduction. (In German.) H. Bühler. *Zeitschrift des Vereines Deutsche Ingenieur,* v. 93, Oct. 11, 1951, p. 932-933.

Literature reviewed shows that "redrawing" reduces internal stress 70-90%. 24 ref. (G4, Q25)

390-G. Relationship of Efficiency of Liquid Media During Free Surface Grinding and the Physicochemical Nature of the Medium and the Metal. (In Russian.) N. A. Pleteneva and G. I. Epifanov. *Doklady Akademii Nauk SSSR,* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Apr. 21, 1951, p. 1051-1053.

Effectiveness of water, hydrocarbons and their chloro-substitutes, alcohols, acids, and complex esters of the aliphatic series on surface grinding of plastic metals, (Al, Cu, Fe, Ni, Pb, Sn, stainless steel, and high-temperature alloys.) (G18)

391-G. Metallurgical Considerations in Machining. I. What Underlies Tool Life and Finish? II. Work and Tool Materials Have Definite Properties. III. Physical Characteristics of Cast Alloys and Carbides. IV. Tool Wear Results From Several Causes. Milton C. Shaw and Prescott A. Smith. *American Machinist,* v. 95, Aug. 20, 1951, p. 89-92; Sept. 17, 1951, p. 139-142; Oct. 15, 1951, p. 130-132; Oct. 29, 1951, p. 100-103.

Part I: The relationship between tool life and finish and microstructure of ferrous metals. Effect of heat treatment on microstructure. Part II: Structures produced by different quenching methods, properties of steels and irons, effects of alloying constituents, and properties of ferrous tool materials. Part III: The Co-base cutting tools, the cemented carbides and their microstructure, and the diamond tools. Part IV: Causes of tool wear which include fusion because of temperature and pressure, lapping action of hard particles in the work material, and cutting speed. (To be concluded.)
(G17, Q general, Q9, M27, TS, ST, C-n)

392-G. The Reliability of Metal Cutting Data. L. V. Colwell. *American Society of Mechanical Engineers,* Paper 51-SA-28, 1951, 12 pages.

Several types of metal-cutting data and information, particularly relative machinability ratings, are questioned as to their reliability for certain applications. Failure of machinability ratings to predict performance. The nature of machinability, and a new three-part program for the accumulation of new and more useful data. (G17)

393-G. The Drilling of Cast Iron With Cemented Carbide-Tipped Drills. E. J. Weller and F. W. Lucht. *American Society of Mechanical Engineers,* Paper 51-SA-35, 1951, 16 pages.

Test data show that more efficient conditions, in so far as horsepower consumption is concerned, are obtained when the drills are operated at the greatest feed per revolution compatible with the limiting factors of the part being machined, the jigs and fixtures used, and the machine-tool equipment available. (G17, T5, CI, C-n)

394-G. Machining Problems With Titanium Alloys. *Automotive Industries,* v. 105, Nov. 1, 1951, p. 46-47, 102. (Extracted from one chapter of "USAF Machinability Report, Vol. 2", 1951, Curtiss-Wright Corp., Wood-Ridge, N. J.)

Turning, milling, cut-off operations, drilling, and tapping. Comparative physical and mechanical properties of three Ti alloys, 24S-T Al, four carbon and low-alloy steels, and five high-temperature alloys are tabulated.
(G17, P general, Q general, Ti, Al, CN, AY, SG-b)

395-G. Douglas Experience in Working Titanium. O. A. Wheelon. *Machinery* (American) v. 58, Nov. 1951, p. 137-143.

Miscellaneous secondary fabrication equipment and procedures developed as a result of research at Douglas Aircraft Co. (G general, Ti)

396-G. Carbide Tooling Reduces Costs in a Brass Mill. Paul S. Schubert. *Machinery* (American) v. 58, Nov. 1951, p. 174-178.

Carbide is extensively used for wear resistant applications, as well as for cutting tools and dies, at Bridgeport Brass Co. These and other uses of carbide under a system of coordinated carbide control. (G17, T6, Cu, C-n)

397-G. A Revolutionary New Method of "Machining" Hard Metals. John S. Roller. *Machinery* (American) v. 58, Nov. 1951, p. 180-181.

See abstract of "A New Method of Machining," *Iron and Steel Engineer,* item 378-G, 1951. (G17)

398-G. Increasing Productivity in Producton Machining. Part 3. Michael Field and Norman Zlatin. *Magazine of Tooling and Production,* v. 17, Nov. 1951, p. 64, 118, 158, 162, 166, 170.

Relative machining and mechanical properties of ductile and gray irons are compared. Machining of wrought SAE 8640 steels.
(G17, Q general, CI, AY)

399-G. Machine-Cutting in the Forge. L. Hodges. *Transactions of the Institute of Welding,* v. 14, Aug. 1951, p. 145-148.

Various examples show how flame cutting can be combined with forging in many cases to produce better results than are obtainable by either process alone. (G22, F22, ST)

400-G. Aluminium Sheathed Cable. P. M. Hollingsworth. *Colliery Guardian,* v. 183, Oct. 18, 1951, p. 437-441. (A condensation.)

Tube-sinking method developed for sheathing. Properties, installation methods, and related topics.
(T7, Al)

401-G. Flame Cutting With Propane. (Continued.) (In French and German.) H. Schulz. *Zeitschrift für Schweisstechnik; Journal de la Soudure;* v. 41, July 1951, p. 125-130; Aug. 1951, p. 141-146.

Preliminary tests made to establish optimum cutting conditions, and equipment and procedure. Graphs and tables show effect of sheet-metal thickness on cutting time and on consumption of fuels. (G22)

402-G. (Book) The Action of Cutting Tools. A. J. Chisholm, J. M. Lickley, and J. P. Brown. 88 pages. Machinery Publishing Co., Ltd., National House, West St., Brighton 1, England. 3s., 6d.

Surface finish, forces on tools, tool wear, and machine vibration; how some of the principles presented are applied to practical cutting tools. The economics of machining, and machine-shop investigations designed to promote productivity.
(G17, Q9, TS)

403-G. (Book) Press Tool Practice. Part IV. P. S. Houghton. 257 pages. Chapman & Hall, Ltd., 37 Essex St., London W. C. 2, England. 21s.

Examples of presswork production, ranging from containers for toilet preparations, ferrules, and umbrella parts, to domestic tinware and art hollow-ware to be plated with precious metals. Some instrument, automobile, and aircraft parts are also included. Tool designs for such products. The hot working of Mg alloys, definitions of press-working terms, and calculation of blank diameters and bending allowances. (G1)

H

POWDER METALLURGY

99-H. Evaluation of Sieve Analyses in Powder Metallurgy. (In Czech.) Adolf Vambersky. *Hutnické Listy,* v. 6, July 1951, p. 320-322.

The proper grain-size distribution of metallic powders. Shows how to determine deviations from ideal behavior and their significance. (H11)

100-H. Bonds of Sintered and Pressed Metals Produced by Pressing and Sintering. (In German.) Wilhelm Hofmann and Ernst Schmalenbach. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft,* v. 3, 1951, p. 163-176.

Bonds between sintered powered metal and wrought metal were obtained in the following combinations: Fe powder upon steel, Fe-Cu upon steel, Pb bronze upon steel, W-Cu upon Cu, and Ag-graphite upon Cu. The powder was pressed into the surface of the base metal and then both were sintered. Influence of grain size, of pressure, and of sintering temperature were investigated. The strength of the joint was examined by tensile and shear test. (H14, H15, Q27, Fe, ST, Cu, W, Ag)

101-H. Production of Metal Powders by Atomization. (In Polish.) W. Rutkowski. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 3, 1951, p. 259-266.

Historical development of metal-powder production by methods based on granulation and atomization. Installations for atomization of low-melting-point metals such as Sn, Pb, Zn, and Al, and of high-melting-point metals such as Cu, bronze, Fe, and steel. Influence of various factors upon the quality of atomized powder and efficiency of the process. 11 ref. (H10)

102-H. Mechanical Properties of Stainless Steel Powder. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1076.

Discussion of above paper (by Arthur H. Grobe and George A. Roberts). (Feb. 1951 issue, see item 6-H, 1951.) (H11, Q27, Q29, SS)

103-H. Fabrication and Properties of Compacts of Pure Tungsten Carbide. A. E. Williams. *Metal Treatment and Drop Forging,* v. 18, Oct. 1951, p. 445-449.

The mechanism of sintering pure tungsten carbide was investigated to develop crucibles and high-temperature furnace parts. The cold-pressing and sintering method and the hot-pressing method. Mechanical properties and microstructure of the products. 10 ref. (H14, H15, W, C-n)

104-H. Powder Metallurgy in 1950. (In German.) F. Benesovsky. *Metall,* v. 5, Sept. 1951, p. 384-388.

A review. 174 ref. (H general)

105-H. Swelling Phenomena and Zone Formation in Hard-Metal Alloys. (In German.) Walther Dawihl. *Zeitschrift für Metallkunde,* v. 42, July 1951, p. 193-197.

Experiments demonstrate that swelling occurs when gases formed during sintering are unable to escape, when the wetting properties of the melt are relatively high, and when gas pressure exceeds the strength of the sintered structure. Zone formation occurs in sintered alloys at temperatures at which the resulting molten phase has low wetting power for the solid structure. These phenomena are applied to WC-TiC solutions. 11 ref.
(H15, C-n, W, Ti)

106-H. Sintered Electrical Contact Materials. Part II. (In Polish.) W.

Rutkowski and St. Stolarz. *Prace Glownego Instytutu Metalurgii*, v. 3, No. 4, 1951, p. 297-305.

Methods of producing contacts based on W-Cu and W-Ag, their properties and applications. Service behavior and commercial production.
(H general, T1, W, Cu, Ag, SG-r)

107-H. Stainless Steel Filter With High Strength Produced by Powder Metallurgy. *Precision Metal Molding*, v. 9, Nov. 1951, p. 39.
(H general, T29, SS)

108-H. Friction or Bearing Surfaces by Powder Metallurgy and Die Casting. H. W. Brock. *Precision Metal Molding*, v. 9, Nov. 1951, p. 40-42, 64-65.

Applications of the processes by Oliver Corp. Advantages.
(H general, E13, SG-c)

109-H. Controlled Porosity Is Utilized for Fluid Distribution in Aircraft De-Icers: An Application of Powder Metallurgy. R. I. Blackwell and J. W. Lennox. *Precision Metal Molding*, v. 9, Nov. 1951, p. 28-31, 65-69.

The porous metal is made from Cu, Ni, and Sn powders carefully controlled as to both mesh size and particle shape. Brazing and sintering operations are involved.
(H11, K8, T24, Cu, Ni, Sn)

110-H. Powder Metallurgy: Past, Present and Future. Robert L. Ziegfield and Kempton H. Roll. *Precision Metal Molding*, v. 9, Nov. 1951, p. 75-82.
(H general)

J HEAT TREATMENT

276-J. Non-Ferrous Wire Annealing at Bridgeport Brass Company. W. J. Krailing. *Industrial Heating*, v. 18, Oct. 1951, p. 1760, 1762, 1764, 1932, 1934.

Equipment and procedures.
(J23, EG-a, Cu)

277-J. ISTC Division VII Reports on Boron Steels. Harry B. Knowlton, editor. *SAE Journal*, v. 59, Oct. 1951, p. 41-47.

Further information on carburizing and heat treating grades of boron steels. Evidence indicates that the heat treating grades (0.30-0.65% carbon) can readily be substituted for higher alloy steels in bolts, springs, axles, and similar parts. Hardenability data as follows are presented: on 14B18—F. F. Vaughn; on SAE 9420 and 94B20—W. E. Jominy; on 4118, 41B18, 50B20, and 8617—Frank Sailer; on 80B20—R. H. Lundquist; on 80B20—S. L. Widrig; on Boron Steels—J. E. Tschopp; on 50B40, 50B50, and 42B60—M. C. Kester, Frank Sailer and C. Parish; on 81B45—B. L. Johnson, Jr. and W. E. Day, Jr.; on 81B40 and 81B45—P. K. Zimmerman; and NE94T22—N. E. Henderickson. (J26, J28, ST)

278-J. Practical Heat Treatment Stress Relieves Stampings. Vincent De Pierre and Harold Bernstein. *Steel*, v. 129, Oct. 22, 1951, p. 88, 90, 93, 96.

Discovery of cracks in a number of one-piece steel stampings, from a lot which had been in storage for some time, initiated an investigation into the cause of failure. The stampings, in the form of right cones, 18 in. high with a 16-in.-diameter base, were made from low-carbon sheet steel, 7/32 in. thick.
(J1, S21, CN)

279-J. Patenting With Continuous Cleaning and Coating. C. H. Williams Jr. *Wire and Wire Products*, v. 26, Oct. 1951, p. 881-883.

Procedures and equipment of Pittsburgh Steel Co., Monessen, Pa. The process is applied to high-carbon steel wire. (J25, F28, CN)

280-J. Hardenability of Steel and Its Determination. (In Czech.) Ladislav Jenicek, Jaroslav Koutecky, and Frantisek Labonek. *Hutnické Listy*, v. 6, Jan. 1951, p. 5-14; Feb. 1951, p. 70-75; Mar. 1951, p. 119-128; May 1951, p. 220-228; June 1951, p. 270-286.

The problem of cooling a quenched body is formulated. Using this formulation as a basis, dimensionless factors influencing the temperature distribution within a quenched body are suggested. G. Sachs' crystallization theory was used to show that after making certain assumptions, diagrams of isothermal breakdown of austenite can serve as criteria for hardenability. Results of experimental quenching of Jominy test bars, test wedges, hollow cones, and cylinders of four different steel compositions. Diagrams and nomograms for various shapes. 56 ref. (J26, ST)

281-J. Annealing Furnaces for Malleable Iron. O. E. Cullen and R. J. Light. *Canadian Metals*, v. 14, Oct. 1951, p. 22-24, 26-28.

See abstract of "Malleable Cast Irons—Annealing Furnaces and Atmosphere," *American Foundrymen's Society*. Preprint; item 137-J, 1951. (J23, CI)

282-J. Heat Treatment of Metals: What It Is and How It May Be Accomplished. Carroll B. Mershon. *Industrial Gas*, v. 30, Oct. 1951, p. 11, 21-26.

General principles of heat treating, operations of heat treatment, and basic equipment used. Specific information on heat treatment of steels. (J general, ST)

283-J. Parts Flattened by Annealing Under Weights. Herbert Chase. *Iron Age*, v. 168, Nov. 1, 1951, p. 134-136.

Annealing under weights has replaced hand straightening on parts made from sheet or strip, cutting costs and aiding production. Fixture design and use are simple but important. Better results are obtained from subsequent operations such as case hardening. Parts are mostly mild steel, though some are alloy steel. (J23, CN, AY)

284-J. Gears Spun in Molten Salt Harden Teeth Only. William F. Sorenson. *Iron Age*, v. 168, Nov. 8, 1951, p. 136-137.

Teeth of gears drop forged from SAE 4140 are being hardened to Rockwell C-52 while gear core hardness is kept at C-36 in a new method developed at Yale & Towne Mfg. Co. Gears revolve in a molten salt bath, are quenched in oil, then tempered. Gears show uniform hardness throughout the area treated. Scaling was eliminated. (J2, AY)

285-J. Application of Induction Heating to Production Heat-Treatment Processes at the Standard Motor Company, Ltd., Banner Lane Works, Coventry. L. H. Williams. *Metal Treatment and Drop Forging*, v. 18, Oct. 1951, p. 460-464.
(J2)

286-J. The Oldsmobile Forge Plant. Part II. Heat Treating and Finishing. John C. McComb. *Steel Processing*, v. 37, Oct. 1951, p. 511-516.

The heat treating cycle. First part: Crankshaft quench and draw, rear axle shaft hardening, connecting-rod heat treatment, cycle annealing and normalizing. Second part: Pickling and shot blasting. Third part: Inspection and maintenance.
(J general, L10, L12, S general, ST)

287-J. Gaseous Carburization. (In French.) *Métallurgie et la Construction mécanique*, v. 83, Sept. 1951, p. 657, 659, 661, 663.

Fundamental principles and improvements possible in a special case. Points emphasized are choice of atmosphere, measuring the cemented layer and maximum carbon content of the surface. Refers only to carburization of steel. (J28, ST)

288-J. Surface Hardening. (In German.) O. Fischer. *Metalloberfläche*, sec. A, v. 5, Aug. 1951, p. A120-A125; Sept. 1951, p. A133-A139.

The two principal methods for surface hardening of carbon, alloy, and stainless steels—namely, hardening by altering the chemical composition of the material and by changing its structure. Photographs, diagrams, graphs, and tables. 16 ref.
(J26, J28, ST)

289-J. Effect of Heating Conditions and Size of Pieces on Hardening Time and Depth in the Rotary Flame Hardening Process. (In German.) A. Matting and H. W. Gronegreb. *Schweissen und Schneiden*, v. 3, Aug. 1951, p. 238-242.

Tables and graphs show experimental results. The use of double burners is more economical, the greater the cross section of the steel and the less its required hardness depth. (J2, ST)

290-J. Annealing and Tempering Steel Bars in an Induction Plant Operated at City Power-System Frequencies. (In German.) Helmut Krainer, Max Kroneis, and Franz Raidl. *Stahl und Eisen*, v. 71, Aug. 16, 1951, p. 880-886; disc., p. 886-888.

Investigation of induction annealing and reheating of bars 20-60 mm. in diam. of eight carbon and low-alloy steels. Resulting mechanical properties are charted and tabulated.
(J2, Q general, CN, AY)

291-J. Steels for Flame, Induction, and Immersion Surface Hardening. (In German.) Hermann Voss. *Stahl und Eisen*, v. 71, Sept. 27, 1951, p. 1037-1040.

Procedures and problems of hardening steels by these methods. A higher carbon content produces higher surface hardness, while steels with a higher alloy content become hardened to greater depths under the same conditions. Graphs and tables include data from the U. S. and England. 13 ref. (J2, ST)

292-J. Strength and Wear of Induction and Case-hardened Gears. (In German.) Heinz Glaubitz. *Stahl und Eisen*, v. 71, Sept. 27, 1951, p. 1040-1044.

Comparative experiments were made on hardness of gear teeth, distortion during hardening, transverse strength and bending fatigue limit, impact strength, and wear resistance of several carbon and low-alloy gears treated by the two processes.
(J2, J28, Q general, CN, AY)

293-J. Hardening and Tempering Steel With the Aid of Fuel Gas—Oxygen Flames Without Furnaces. (In German.) Hans Bühler. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 93, Aug. 21, 1951, p. 756-758.

Experiments on the flame hardening of steel. Physical properties of flame hardened and furnace hardened steels are compared and diagrams illustrate the importance of correct preheating. 15 ref. (J2, ST)

294-J. Stress-Relief Annealing of Iron Castings. (In Italian.) Giorgio Cola. *Tecnica Italiana*, v. 6, July-Aug. 1951, p. 324-334.

Reviews the literature. Data are extensively tabulated and charted. 29 ref. (J1, CI)

295-J. The Surface Hardening of Steel. Part IX. Nitriding and Cyaniding Processes. G. T. Colegate. *Metal Treatment and Drop Forging*, v. 18, Oct. 1951, p. 469-475.

Advantages and disadvantages of nitriding compared with other case-hardening processes. The characteristics of nitrided cases and the application of nitrided steels. Principles and practices of cyaniding and similar processes. (To be continued.)
(J28, ST)

296-J. Sub-Zero Chilling Has Become a Valuable Metallurgical Process. Rolland S. Jamison. *Refrigerat-*

ing Engineering, v. 59, Nov. 1951, p. 1082-1085, 1134, 1136.

Previously abstracted from "Sub-Zero Chilling as a Metallurgical Process", *Modern Machine Shop*. See item 264-J, 1951. (J2)

K

JOINING

624-K. Welded Store Requires Less Steel. J. B. McCormick. *Engineering News-Record*, v. 147, Oct. 18, 1951, p. 51.

(K general, T26)

625-K. Equipment and Design. Charles Owen Brown. *Industrial and Engineering Chemistry*, v. 43, Oct. 1951, p. 93A-94A, 96A.

Details in the welding of light and corrosion resistant metals. (K general, SS)

626-K. The Flow of Liquid Metals on Solid Metal Surfaces and Its Relation to Soldering, Brazing, and Hot-Dip Coating. G. L. J. Bailey and H. C. Watkins. *Journal of the Institute of Metals*, v. 80, Oct. 1951, p. 57-76.

Earlier investigations of soldering performance. Theory of factors controlling flow of liquids on solid surfaces. Experimental investigations of the behavior of several liquid metals and alloys in contact with various solid metals. The production of particularly low contact angles between Pb and Fe or Cu and between Sn and Cu, through very small additions to the Pb or Sn. 19 ref. (K7, K8, L16, Pb, Fe, Cu, Sn, SG-f)

627-K. Use of a Photo-Electic Cell for Accurate Work Location for Riveting Operations. H. L. Hubbard. *Machinery* (London), v. 79, Oct. 4, 1951, p. 587-588.

Method and equipment used at the Torrance, Calif., plant of North American Aviation. (K13)

628-K. Brazed Aluminum Heat Exchangers. *Modern Metals*, v. 7, Oct. 1951, p. 25-28.

New process developed by Trane Co., LaCrosse, Wis. (K8, Al)

629-K. The Cost Picture of Shielded Arc Welding. H. E. Rockefeller. *Canadian Metals*, v. 14, Oct. 1951, p. 36-38.

Cost comparison between Heliarc and sigma welding for copper alloys, stainless, and carbon steels. Advantages and applications of each process. (K1, Al, Cu, CN, SS)

630-K. Investigation of the Adherence of Glass to Metals and Alloys. R. C. Dartnell, H. V. Fairbanks, and W. A. Koehler. *Journal of the American Ceramic Society*, v. 34, Nov. 1951, p. 357-360.

Commercially pure metals, composed of one phase, and alloys, composed of two phases, were investigated. The effect of heat treatment of a modified brass sample as well as the effect of increasing the percentage of carbon in iron was investigated with respect to adherence temperatures. The samples with high adherence temperatures were investigated with respect to persistence, using amber and clear soda-lime glass. (K11, Fe, Cu)

631-K. Silver Brazing Single Handle Mixing Faucets. Howard E. Jackson. *Modern Machine Shop*, v. 24, Nov. 1951, p. 206-208, 210, 212, 214.

Procedures and techniques. Parts are made from wrought brass and stainless steel. (K8, Cu, SS)

632-K. Automatic Welding on the Right-of-Way Applied on Service Pipe Line Project. Paul Reed. *Oil and Gas Journal*, v. 50, Nov. 1, 1951, p. 72.

Methods and techniques employed. (K1, CN)

633-K. Welding Inconel "W" Sheet. Allan J. Rosenberg. *Steel*, v. 129, Nov. 5, 1951, p. 99-102.

How this Ni-base alloy can be successfully welded by inert-arc, metal-arc, and resistance welding processes. While direct aging is satisfactory for short-time properties, annealing prior to aging increases 100-hr. stress-rupture values. For optimum resistance welding conditions, high unit pressures and slow weld cooling should be utilized. Filler material is advisable for best inert-arc-welded joint strengths. (K1, K3, Q general, Ni)

634-K. Welding Repair of Forging Equipment. James M. Wilson. *Steel Processing*, v. 37, Oct. 1951, p. 501-504, 533.

Application of Thermit welding for repair and fabrication of heavy parts. Set-up for a typical weld. (K4)

635-K. New Wrinkles in Heat Exchangers. Clyde B. Clason. *Welding Engineer*, v. 36, Nov. 1951, p. 33-35.

Corrugated Al heat exchangers and their production by Trane Co., La Crosse, Wis. Emphasis is on the new brazing process used. (K8, T5, Al)

636-K. All-Welded Framework in New Department Store. Fred M. Burt. *Welding Engineer*, v. 36, Nov. 1951, p. 36-38, 41.

See abstract of "Welded Robinson Structure Permits 15% Steel Saving", *Western Metals;* item 546-K, 1951. (K1, T26, CN)

637-K. Titanium Is Weldable. Thomas A. Dickinson. *Welding Engineer*, v. 36, Nov. 1951, p. 39-41.

Welding processes and equipment used. Mechanical properties of the welds are charted, tabulated, and discussed. Welding of Ti to other metals is not yet feasible. (K general, Ti)

638-K. Microwave. Sam Kaplan. *Welding Engineer*, v. 36, Nov. 1951, p. 42-44.

Giant Al screens used in microwave radio and television transmission, and their fabrication by inert-arc welding. (K1, T1, Al)

639-K. What You Should Know About Welding. W. C. Mearns. *Welding Engineer*, v. 36, Nov. 1951, p. 45-47.

Recommendations applying to all forms. Results of experimental installations of arc-welded centrifugally-cast ductile-iron pipe. (K general, K1, CI)

640-K. Faster Production by Stud Welding. *Welding Engineer*, v. 36, Nov. 1951, p. 51.

Application to fabrication of large power and steam-generating equipment by Combustion Engineering Superheater, Inc., East Chicago, Ind. (K1, CN)

641-K. Ways to Weld Magnesium Alloys. R. L. Nelson and I. C. Mattson. *Welding Engineer*, v. 36, Nov. 1951, p. 52-56.

Recommended procedures and their application to miscellaneous products. (K general, Mg)

642-K. Thermit Helps Texas Drilling. Jack I. Medoff. *Welding Engineer*, v. 36, Nov. 1951, p. 58-60.

How thermit welding is being applied in the Texas oil fields to repair drill stems and drill collars. (K4, ST)

643-K. Byron Jackson Uses Welded Fabrication for Increased Flexibility of Design; Improved Product Reliability; Reduction in Costs. F. R. Drahos. *Western Metals*, v. 9, Oct. 1951, p. 23-25.

Filler-rod material; joint design; welding procedure; operator ability; and the physical, chemical and thermal characteristics of the material or materials used. (K1)

644-K. Induction Brazing of Large Rotors. P. H. Brace and E. B. Fitzgerald. *Westinghouse Engineer*, v. 11, Nov. 1951, p. 184-185.

Process offers advantages of rapid and hence concentrated heating, uniformity, speed, and automatic control. The job consists of brazing each of many closely spaced copper bars into a copper short-circuiting ring. (K8, Cu)

645-K. Construction of Metal Containers by Electric Spot-Welding System. (In French.) A. Klopfert. *L'Ossature Métallique*, v. 16, Oct. 1951, p. 485-488.

Design and construction of large steel boxes for railway transportation of merchandise. (K3, CN)

646-K. Light Metal Davits Welded in an Argon Atmosphere. (In French.) Charles Guinard and Pierre Vidal. *Revue de l'Aluminium*, v. 28, July-Aug. 1951, p. 290-294.

Davits constructed by two different firms, one using the Nertalic semi-automatic process with the feed metal electrode, the other the tungsten-electrode process, both in an atmosphere of argon. The two davits showed performances similar to those of welded steel structures, with a weight saving of about 50%. (K1, T26, Al)

647-K. The Properties of Arc Welding Electrodes With Basic Coatings. (In French.) Daniel Seferian. *Revue de Métallurgie*, v. 48, Aug. 1951, p. 579-597; disc., p. 597.

Experimental details and theoretical evaluation, such as study of slag-metal equilibria, of structure and mechanical properties of welds in carbon steel made with basic electrodes. 35 ref. (K1, CN)

648-K. How to Measure Voltages and Currents in Electric Arc Welding. (In French.) A. Gaubert. *Soudure et Techniques connexes*, v. 5, July-Aug. 1951, p. 145-155; disc., p. 155-156.

Electromagnetic measuring device constructed for above in industrial as well as laboratory use. (K1)

649-K. Applications of Welding in Construction of Metallurgical Equipment. (In French.) P. Levivier. *Soudure et Techniques connexes*, v. 5, July-Aug. 1951, p. 159-163; disc., p. 163-165.

Construction of welded blast furnaces. (K general, T5, CN)

650-K. Electric Arc Welding in a Gaseous Medium. (In French.) *Soudure et Techniques connexes*, v. 5, July-Aug. 1951, p. 179-181.

Reviews the literature. 26 ref. (K1)

651-K. Flaw Formation in Welds. (In German.) Walter Eilender, Heinrich Arend and Werner Neuhaus. *Archiv für das Eisenhüttenwessen*, v. 22, July-Aug. 1951, p. 261-263.

The cause of circular or oval height flaws (fisheyes) on the fracture surface of welds in steels, especially Cr-Ni steels. Results show that the number of fisheyes can be reduced by proper welding conditions and eliminated by subsequent heat treatment. (K9, ST)

652-K. Light-Metal Welding in Apparatus Construction. (In German.) A. Matting. *Metall*, v. 5, Oct. 1951, p. 429-434.

Weldability of the most important Al alloys, the problem of weld cracking, corrosion resistance, and the most important welding methods. (K general, R general, Al)

653-K. Research on Welding With "Deep-Burning" Electrodes. (In German.) A. Buchholz. *Schweissen und Schneiden*, v. 3, Aug. 1951, p. 233-237.

Use for welding of steel was found to result in considerable advantage, although the operation requires somewhat more skill. (K1, ST)

654-K. The Kaell Welding Process. (In German.) Fr. Bischof. *Schweissen und Schneiden*, v. 3, Ag. 1951, p. 248-252.

Process using coated double electrodes for welding of steel. Compositions of the electrodes and the coating; equipment. Comparative re-

sults with this method and with hand welding are tabulated and illustrated by micrographs and macrographs. (K1, ST)

655-K. Cast-Iron Welding. (In German.) Viktor Walter. *Schweisstechnik*, v. 5, May 1951, p. 56-57; June 1951, p. 68-69.

Avoiding shrinkage stresses by slow preheating of cast iron parts. These stresses can also be counteracted by applying an equal but opposite stress. (K general, CI)

656-K. Effect of Hot Working on Aging Tendency of Submerged-Melt Welds. (In German.) *Schweisstechnik*, v. 5, June 1951, p. 64-68.

Experiments showed that the aging tendency of welds in steel is reduced by hot working. Effect of degree of working on notch toughness was investigated. Mechanical properties resulting from different types of heat treatment were studied and compared.
(K1, Q general, CN)

657-K. Cold Shortness in the Welding of High Quality Steels. (In German.) W. Hummitzsch. *Schweisstechnik*, v. 5, July-Aug. 1951, p. 88-91.

Directions for the prevention of cold shortness. Experiments were made on several low-alloy Cr-Ni-Mo steels. Reheating is recommended when the welding process causes the weld bead to contain considerable amounts of hydrogen.
(K general, Q23, AY)

658-K. Filler Materials Used in Welding Unalloyed and Low-Alloy Steels. (In German.) Werner Hummitzsch and Franz Rapatz. *Stahl und Eisen*, v. 71, Aug. 30, 1951, p. 925-940; disc., p. 940.

Welding rods, welding procedures, and mechanical properties of welds in several steels. 36 ref.
(K1, K2, T5, CN, AY)

659-K. Progress in Thermit Welding. (In German.) Wilhelm Ahlert. *Werkstoff und Korrosion*, v. 2, Aug., 1951, p. 292-296.

Chemical and thermochemical principles of the thermit process. New developments in technology and applications in connection with welding of steel. (K4, ST)

660-K. Welding Light Metals. (In German.) P. Brenner. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 93, Aug. 1, 1951, p. 729-735.

Light metals are more and more frequently being welded under protective gas shielding. Comparative data for welding of Al and its alloys illustrate the relative strength properties of welds. Weld design. 15 ref.
(K1, Al)

661-K. Welding for Die Repair. Ed Brenner and Ernest Smith. *Industry & Welding*, v. 24, Nov. 1951, p. 31-32, 34.

Procedures carried on at Willys-Overland Motors, Inc., Toledo. Equipment and materials. Applications to gray-iron alloy cast structures, heat treatable steels, and hot-forged dies. (K general, T5, CI, ST)

662-K. Measurement of Electrode Force on Resistance Welding Machines. J. J. Riley. *Industry & Welding*, v. 24, Nov. 1951, p. 40, 42.

Measurement of electrode force to insure that adequate force is exerted and maintained on the weld being made. (K3)

663-K. Newer Techniques, Latest Methods for Torch Brazing Aluminum. *Industry & Welding*, v. 24, Nov. 1951, p. 44-45, 47, 76-77.

Includes design, cleaning, and flux removal. (K8, L12, Al)

664-K. Intelligent Integration of Men and Machines Combined With Engineering and Management Know-How Results in High Quality Production. *Industry & Welding*, v. 24, Nov. 1951, p. 48-50, 52, 67.

How practices at Steel and Alloy Tank Co. result in the production of complicated weldments, pressure vessels and towers of mild steel, stainless steel, nickel, Monel, Inconel, chromium steel and heavy clad steels.
(K general, T26, CN, SS, Ni, Cr, ST)

665-K. Resistance Soldering Increases Valve Production 25 Per Cent. *Industry & Welding*, v. 24, Nov. 1951, p. 55-57.

How resistance soldering joins Cu tubing to cast brass valve bodies without annealing. (K7, Cu)

666-K. Manual vs. Automatic Welding. Bernard J. Smolka and Herbert Gefvert. *Industry & Welding*, v. 24, Nov. 1951, p. 59-60.

As applied to the fabrication of basic motor-frame rings at Reliance Electric & Engr. Co., Cleveland. Cost analysis is given. (K1)

667-K. Adhesives in Machine Design. John Delmonte. *Machine Design*, v. 23, Nov. 1951, p. 96-101, 192.

Adhesive selection, properties, and compositions as well as application to a variety of bonding problems in construction of assemblies. Includes rubber-metal, plastic-metal, and metal-metal joining. (K12, K11)

668-K. Metal Stitching Speeds Assembly, Reduces Cost. Part I. Arthur G. Denne. *Tool Engineer*, v. 27, Nov. 1951, p. 40-42.

Advantages of this type of joining over other methods. Cost data are presented. (To be continued.) (K13)

669-K. Recent Advances in the Technique of Electric Spot Welding of Aluminium Alloys in the French Aircraft Industry. J. Faguet. *Transactions of the Institute of Welding*, v. 14, Aug. 1951, p. 110-120.

The results obtained, methods by which they have been achieved, current-control methods, and reliability of the various methods of welding; also some applications to the welding of aircraft components subject to heavy stresses. (K3, Al)

670-K. British Experience in the Argon Arc Welding of Aluminium. W. V. Binstead and E. G. West. *Transactions of the Institute of Welding*, v. 14, Aug. 1951, p. 121-139.

The process and equipment available in Britain; typical applications of the process; some of the problems requiring further investigation. 38 ref. (K1, Al)

671-K. Recent French Studies on the Weldability of Aluminium-Magnesium Alloys. J. Herenguel and M. Hollard. *Transactions of the Institute of Welding*, v. 14, Aug. 1951, p. 140-144. (Translated from the French.)

The general problem, the phenomenon of blistering, and crack sensitivity of welds in Al-Mg alloys. The alloys involved contain mainly Al. (K9, Al)

672-K. Developing a Weldable High Tensile Steel From 18-Lb. H. F. Melts. *Welding Research*, v. 5, June 1951, p. 189r-196r.

Preliminary work of the FM.8 Committee of the British Welding Research Assn. in their effort to develop a weldable high-tensile steel having a 0.2% proof stress of 30 tons per sq. in. The possibility of an 18-lb. high-frequency induction furnace melt providing sufficient material for a modification of the Reeve fillet-weld cracking test. The determination of weldability, steelmaking technique, and examination of mechanical properties of the steels were standardized by using one steel from the proposed range of compositions to determine a satisfactory procedure.
(K9, Q general, CN)

673-K. Control of Cracking in Arc Welding High Tensile Structural Steels. C. L. M. Cottrell, M. D. Jackson, and J. G. Whitman. *Welding Research*, v. 5, Aug. 1951, p. 201r-215r.

Problem of welding a prefabricated bridging structure in a high-tensile structural steel. The structure was fabricated from low-alloy high-tensile steel rolled sections and plates using the a.c. metallic-arc process. All relevant data were recorded for each joint. The joints were afterwards sectioned and examined for presence or absence of cracks, and in this way it was possible to determine the minimum requirements to insure crack-free welds. (K3, K9, CN)

674-K. (Book) **Electronic Motor and Welder Controls.** George M. Chute. 348 pages. 1951. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. $6.50.

Welding controls of the most modern types and various commercial apparatus. (K1, K3)

L

CLEANING, COATING AND FINISHING

739-L. Conservation in Enameling Operations. Evan M. Oliver. *Better Enameling*, v. 22, Oct. 1951, p. 6-7, 22-23, 28, 32.

Storing, milling, reclaiming, dipping, slushing, spraying, firing, and reworking defective ware. (L27)

740-L. Mt. Vernon Furnace & Mfg. Co. *Better Enameling*, v. 22, Oct. 1951, p. 8-13.

Metal forming, frit milling, metal preparation, and enamel application and processing. (L27, G general)

741-L. Hard Chrome Surfacing for Crankshafts. Richard S. Love. *Diesel Power & Diesel Transportation*, v. 29, Oct. 1951, p. 56-58.

Procedures and equipment.
(L17, Cr, ST)

742-L. Regrinding and Metallizing Crankshafts. *Diesel Power & Diesel Transportation*, v. 29, Oct. 1951, p. 59-61.

Recommended repair and maintenance procedures. (L23, ST)

743-L. Cements. C. R. Payne. *Industrial and Engineering Chemistry*, v. 43, Oct. 1951, p. 2203-2207.

Improved reinforced furan-resin linings bonded to steel which are serving as substitutes for corrosion resistant metal alloys in the construction of reactors, tanks, towers, and fume ducts. Fundamental factors influencing the service life of acid-proof brick linings in sulfite digesters. A number of improvements were made in the physical and chemical properties of acid-proof cements, and new techniques of application were developed to extend the range of their industrial uses. 105 ref. (L27, ST)

744-L. Hydrodynamics of Cathode Films. Garbis H. Keulegan. *Journal of Research of the National Bureau of Standards*, v. 47, Sept. 1951, p. 156-169.

A hydrodynamical theory of the cathode diffusion layer is based on the assumption of uniform density reduction at the cathode surface. By means of an approximate solution for the flow and the diffusion equation, layer dimensions, velocity distributions, and densities were determined. Further derivations from the solutions directly applicable to results obtained by the freezing method were made. The data of Brenner on Cu and Ni baths are considered. Using observed values of density reductions at the cathode surface, maximum width of the layer, average densities for a given distance from the cathode and mobilities of the cations were determined and compared with observations. (L21)

745-L. Italian Electroplating Industry. Giuseppe Bianchi. *Metal Industry,* v. 79, Oct. 5, 1951, p. 298-299. (L17)

746-L. Improved Enamels Extend Life of Steel Chlorination Pipe. L. E. Dube and Norman Stromdahl. *Steel,* v. 129, Oct. 22, 1951, p. 70-72, 99.

How compositions and firing techniques were modified to ease the corrosion problem in black pipe used for fluxing and degassing Al alloys. Average life of 10 min. is multiplied 15 to 25 times, without excessive cost increase. (L27, ST)

747-L. Plating Room Controls Cut Operating Costs, Curb Stream Pollution. *Steel,* v. 129, Oct. 29, 1951, p. 66-68. (Based on "Plating-Room Controls for Pollution Abatement," *Metal Finishing Industry Action Committee; Ohio River Valley Sanitation Commission,* July 1951.)

Previously abstracted from original. See item 670-L, 1951. (L17, A8)

748-L. Recent Ceramic Coating for High-Temperature Alloys. *Technical News Bulletin* (National Bureau of Standards), v. 35, Oct. 1951, p. 145-147.

New developments at National Bureau of Standards under sponsorship of NACA. The latest development, known as "A-417", is applied by spraying or dipping and is then fired for a few minutes at 1850° F. (L27)

749-L. Process Control in Making Enameled Wire. R. F. Thompson. *Wire and Wire Products,* v. 26, Oct. 1951, p. 885-887, 997-998.

Either a dip or a die process may be used in applying the coating to enameled magnet wire. Advantages and disadvantges of each under various circumstances. Details of dip process as used by Westinghouse at Buffalo, with emphasis on control methods and apparatus. (L27, Cu)

750-L. Depolarizing Agents and Their Effects and Savings in Cleaning of Rods and Wire. Joseph T. Irwin. *Wire and Wire Products,* v. 26, Oct. 1951, p. 899-901, 994-996.

Work with depolarizers in acid pickling of iron and steel. Laboratory findings and actual production results in steel mills and fabricating plants. The agents emphasized are produced by Azed, Inc., Waukegan, Ill. (L12, ST)

751-L. A Progress Report on the Development of the Wheelabrator Mechanical Cleaning Process. Gilbert D. Dill. *Wire and Wire Products,* v. 26, Oct. 1951, p. 910-913, 992-993.

Use in the steel industry in general and in the cold rolling and cold drawing divisions in particular. (L10, ST)

752-L. Liquid Chemical Blanket for Hot Galvanizing Surfaces. A. A. Paterson. *Wire and Wire Products,* v. 26, Oct. 1951, p. 918-919, 989.

The formation of oxides on galvanizing pans is the cause of loss each year of millions of pounds of pure zinc in the galvanizing industry. A method of overcoming the problem would be use of a liquid which would completely seal the surface of the spelter pan from the atmosphere. After some unsuccessful experiments with various combinations of $ZnCl_2$ and NH_4Cl, a compound (composition not given) said to give good results was developed. Cost savings and several other advantages. (L16, Zn, Cn)

753-L. Catalytic Combustion in Wire Enameling. R. J. Ruff. *Wire and Wire Products,* v. 26, Oct. 1951, p. 936-939, 987-988.

Equipment and procedures designed to alleviate air-pollution problems resulting from the fumes given off from enameling operations. It is a low-temperature oxidation process which occurs when burnable fumes are simply passed through a stationary, porous, essentially permanent catalytic element. (L27)

754-L. Application of Electropolishing and X-rays to the Study of Hard Chromium. Preliminary Results Concerning the Influence of the Surface Condition of the Steel Base. (In French.) P. A. Jacquet and A. R. Weill. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1949, p. 4-20.

The relationship between treatment of the surface of the steel and properties of Cr deposits was investigated. Compares in particular the structure and properties of steel polished mechanically and electrolytically. 13 ref. (L13, L17, M27, ST, Cr)

755-L. Evolution of Industrial Application of Hard Chromium in France. (In French.) De Buyer. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1949, p. 22-27.

Reviews the history of hard-chromium applications, present day usage, and future possibilities in France. (L17, Cr, ST)

756-L. Magnetic Control of Chromium Thickness. (In French.) Brachet. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1949, p. 28-31.

Various methods based either on attraction or induction, and devices of measuring used in France, the U. S. and Germany. (L17, Cr, ST)

757-L. Hard Chromium Plating of Gages. (In French.) Meynier. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1949, p. 32-36.

Experiments on thin hard-chromium plating of simple and threaded gages for checking screw threads. Shows that it is possible to re-cover used gages by removing the old layers of thin hard Cr, and plating them again. (L17, Cr, ST)

758-L. Experiments on the Use of Hard Chromium in Hand Glass Making. (In French.) Perrin. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1949, p. 40-42.

Experiments with glass-making molds for testing the advisability of Cr plating the molds. Results of experiments, and possibilities of commercial application. (L17, Cr, ST)

759-L. Applications of Hard Chromium in the Textile Industry. (In French.) Hanicot. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1949, p. 43-47.

Experiences with Cr plating various parts of textile machinery. Results show the wide range of new applications of the process, which helps combat the wear of textile machinery. (L17, T29, Cr)

760-L. Some Applications of Hard Chromium in Engine Production. (In French.) De Vaulchier. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1949, p. 48-55.

Plating of cylinders with porous Cr, and various applications in thin and thick Cr plating of tools. Results of experiments are outlined. (L17, T25, Cr, ST)

761-L. Apparatus for Hard Chromium Plating. (In French.) Loiseau. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1949, p. 56-60.

Details of equipment and procedures. Two principal types of equipment and three principal types of plating are covered. (L17, Cr)

762-L. Review of Foreign Work on Hard Chromium. (In French.) Morisset. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1949, p. 64-70. 27 references. (L17)

763-L. Advantages of Chromium Plating of Cutting Tools. (In French.) M. Martin. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1950-51, p. 19-20.

The savings made possible. Refutes arguments against the procedure. (L17, T6, TS, Cr)

764-L. Recent Progress in the Chromium Plating of Gages. (In French.) Meynier. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1950-51, p. 21-25.

Reports on recent tests on Cr plating of threaded plug gages. The profile of the plugs was studied before and after applying both thin and thick layers. Future possibilities. (L17, T7, Cr, ST)

765-L. The Effects of Chromium Plating on Cutting Tools. (In French.) P. Armagnat. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1950-51, p. 26-31.

Experiments on the cutting phenomenon and the influence of the type of application of the tools on cutting conditions. (L17, T6, Cr, TS)

766-L. Present Research in France and Abroad on Hard Chromium. (In French.) Morisset. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1950-51, p. 48-52.

A review. (L17, Cr)

767-L. Influence of Certain Organic Compounds on the Structure of Cathodic Lead Produced From Acetate Solution. (In Polish.) M. Perec. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 3, 1951, p. 217-231.

Conditions for adsorption of organic compounds on a polarized cathode. Effects of glue, gelation, diphemylamine, phenol, and B-naphthol on reduction of Pb^{++} in an acetate solution were studied polarographically. 14 ref. (L21, C23, Pb)

768-L. Action of Inhibitors in the Acid Pickling of Steel. Part III. Influence of Concentration of Acid on Effectiveness of Inhibition of the Solution of Iron and Nickel in Hydrochloric Acid in the Presence of Dibenzyl Sulfoxide. (In Polish.) M. Smialowski and Z. Ostrowski. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 3, 1951, p. 251-254.

Results of experiments are charted, tabulated, and discussed. (L12, ST)

769-L. Perhaps You Can Make Use of Evaporation Coating. Thomas A. Dickinson. *American Paper Converter,* v. 25, Nov. 1951, p. 10-11, 54, 56, 58.

Development on a commercial scale of the evaporation coating process, whereby metals or other materials are vaporized in a vacuum and deposited on paper or film. (L25)

770-L. A Study of Primers for Ferrous Metals in an Atmospheric Exposure. T. A. Dembski, R. Marotta, F. W. Alvarez, E. Berberian, S. A. Fine, R. L. Feffrey, H. Jerome, H. Kelfer, B. J. Mayo, F. S. McIllwaine, W. B. Pierce, S. White, B. Wilson, and E. Zarach. *American Paint Journal,* (Convention Daily), v. 36, Nov. 3, 1951, p. 28-29.

Results from a 5-year atmospheric exposure of 56 metal primers. Types of primer that will function best as a shop coat. (L26, ST)

771-L. Ceramic Coating for Steel. *Canadian Metals,* v. 14, Oct. 1951, p. 40.

A finish of the type known as "Stoneclad". Applications for the protection of mild steel. (L27, ST)

772-L. Enameling of Aluminum. C. R. Sigler. *Ceramic Age,* v. 58, Oct. 1951, p. 15-16, 20, 47.

A survey of the development and various procedures used. (L27, Al)

773-L. Cermetallic Finishing. Thomas A. Dickinson. *Ceramic Age,* v. 58, Oct. 1951, p. 21, 24.

Mixed ceramic and metal powder finishing and its application to both ferrous and nonferrous surfaces. (L27)

774-L. Strong Shows Toughness of New One Coat Enamel. *Ceramic Industry*, v. 57, Nov. 1951, p. 60.

Outlines paper by Paul S. Cecil of Strong Mfg. Co., Sebring, Ohio, who described the Ti-Loc pretreatment process for steel. This process permits direct application of the white coat. Acid resistance, reflectivity, resistance to thermal shock and abrasion, color stability and other properties are not sacrificed. (L27, ST)

775-L. How Kawneer Enamels Aluminum. C. R. Sigler. *Ceramic Industry*, v. 57, Nov. 1951, p. 61-62, 109, 111. (Based on E. I. Du Pont de Nemours & Co., Bulletin 31.)

A 6-step enameling process used to coat 61S Al with vitreous enamel, as modified by Kawneer Co., Niles, Mich. Steps are: metal pretreatment, milling the enamel, spraying, firing, testing and inspection, and rerolling. (L27, Al)

776-L. Bull's Eye and New Targets. *Chemical Week*, v. 69, Nov. 3, 1951, p. 37-38.

Developments in Fe, Zn, and Mn coatings. New fields of application. (L general, Fe, Zn, Mn)

777-L. Small Tubes Made by Electrodeposition. *Electronics*, v. 24, Nov. 1951, p. 216, 220. (Condensed from "Making Small Metal Tubes by Electrodeposition of Nylon Fibers", by R. J. E. Gezelius, *Review of Scientific Instruments*, v. 21, Oct. 1950, p. 886.)

Describes an innovation in the above—that is, use of a silvered nylon fiber as a mandrel. Procedure is outlined. (L)

778-L. Heat-Retardant Paints and Coatings. James J. Duggan. *Factory Management and Maintenance*, v. 109, Nov. 1951, p. 101-103.

Results of four series of tests covering steel structural members; steel pipe (empty and water-filled); steel shipping containers; steel-clad wooden doors; and flat steel plates. Results indicate that heat-retardant coatings should be considered for use on all types of structural steel fire-resistant and noncombustible construction. (L26, ST)

779-L. A New Process for One Coat White Direct to Steel. Paul L. Cecil. *Finish*, v. 8, Nov. 1951, p. 36-37.

Photographs of demonstration tests following the application of cover-coat porcelain enamels direct to steel. (L27, ST)

780-L. A Symposium on Conservation of Pickle Room Materials. Part I. Conservation of Cleaner. J. J. Baker. **Part II. Conservation of Sulphuric Acid and Nickel Sulphate.** M. H. Whitehead. **Part III. Conservation of Sodium Cyanide Neutralizers.** Lewis C. Farrow. *Finish*, v. 8, Nov. 1951, p. 38-40, 45, 73.

Procedures and techniques. (L12)

781-L. Ceramic Coatings for the "Hot Spots". Wilson G. Hubbell. *Finish*, v. 8, Nov. 1951, p. 33-34, 104, 106.

Background information and service test data. Tests conducted at Ryan Aeronautical Co. (L27)

782-L. Galvanizing in 1951. Nelson E. Cook. *Journal of the American Zinc Institute*, v. 29, 1951, p. 11-17.

Economic aspects.
(L16, A4, Zn, ST)

783-L. Anode Polarization Effects of Nickel in Sulfuric Acid. Dennis R. Turner. *Journal of the Electrochemical Society*, v. 98, Nov. 1951, p. 434-442.

Study to determine the nature of the electrode reactions involved. Current densities below and above that required to passivate a nickel anode were used. There was evidence of an anodic film forming at the active nickel surface prior to the onset of passivity. The nickel oxide formed anodically was soluble in the acid solution and controlled the rate of polarization decay. 14 ref. (L17, Ni)

784-L. Electrodeposition Behavior of Traces of Silver. II. Effects of Electrode History and the Presence of Other Ions. III. Transition Region Between "Trace" and "Macro" Behavior. John T. Byrne, L. B. Rogers, and John C. Griess, Jr. *Journal of the Electrochemical Society*, v. 98, Nov. 1951, p. 447-456.

Part II: The behavior of amounts of silver deposited in less than a monolayer on an inert electrode was determined in the presence of several ions. Relatively large amounts of Cu (II), Pd (II), and Pt (IV) were without effect, but changes in the concentration of H ion produced a significant effect. Part III: By starting with a solution containing a "trace" of silver and making stepwise additions of known amounts of silver followed each time by a deposition curve, the behavior of intermediate amounts was elucidated. A series of curves was obtained for Pt, Pd, and Au electrodes in various media. 15 ref. (L17, Ag)

785-L. Critical Interpretation of Electrodeposition Studies Involving Traces of Elements. John T. Byrne and L. B. Rogers. *Journal of the Electrochemical Society*, v. 98, Nov. 1951, p. 457-463.

Shows that a large part of the electrode surface may contribute to undervoltage phenomenon and that a more satisfactory picture of the deposition process is obtained by abandoning the concept of discrete active centers and considering instead the relationship between the energy of deposition of the deposited element and its energy of sublimation. 22 ref. (L17)

786-L. Overpotential. J. O'M. Bockris. *Journal of the Electrochemical Society*, v. 98, Nov. 1951, p. 153C-157C.

Historical observations, factors hindering progress and theoretical aspects. Additional work required. (L17)

787-L. Nonporous Refractory Coatings Permit Use of Mild Steel for High Temperature Applications. *Journal of Metals*, v. 3, Nov. 1951, p. 980.

Use of "Stoneclad" process, recently developed by a British firm. It is also applicable to cast iron.
(L27, CN, CI)

788-L. Vinyl-Resin Coatings in Petroleum Refineries. C. G. Munger. *Mechanical Engineering*, v. 73, Nov. 1951, p. 899-902.

Applications. Vinyl resins have the basic resistance and chemical properties required for resistance to refinery corrosion. (L26)

789-L. The Control of Bright Zinc Plating. F. J. Kolar, Jr. *Metal Finishing*, v. 49, Nov. 1951, p. 52-55.

Control of bright Zn baths by controlling the cyanide-zinc ratio. Role of brighteners in Zn baths. Analytical control of the sulfide purifier and statistical quality control for automatic plating operations are presented as new ideas for process control. (L17, Zn)

790-L. Problems of Plating Powder Metal Parts. J. D. Shaw, W. V. Knopp and C. L. Clark. *Metal Finishing*, v. 49, Nov. 1951, p. 56-58.

The nature of porous and dense products. Various methods of plating. References. (L17, H general)

791-L. The Use of Glycerine in Metal Finishing. E. Scott Pattison. *Metal Finishing*, v. 49, Nov. 1951, p. 62-64.

Use in electrolytic, chemical, and mechanical processes. Application to various types of metals.
(L general)

792-L. Practical Barrel Finishing. Part III. Peter L. Veit. *Metal Finishing*, v. 49, Nov. 1951, p. 65-73, 76.

Various characteristics of individual metals and barrel cycles for each metal.
(L10, Cu, Al, Fe, Zn, Pb, Ag, Au)

793-L. A New Finish for Magnesium Alloys. Harry A. Evangelides. *Organic Finishing*, v. 12, Oct. 1951, p. 17-22.

Previously abstracted from *Metal Finishing*. See item 720-L, 1951.
(L13, R general, Mg)

794-L. Substitute Finishes for Electroplating. *Plating*, v. 38, Nov. 1951, p. 1153, 1156.

Discussion of five papers published in the Oct. issue. (L general)

795-L. Purification of Plating Solutions by Low Current Density Electrolysis. C. E. Naylor. *Plating Notes*, v. 3, June, 1951, p. 77-90.

A literature survey. Data on various treatments are tabulated. Includes notes on the effects of certain concentrations of various impurities which should be useful in assessing possible causes of defects in deposits. (L17)

796-L. Broader Use of Hot-Sprayed Lacquer Seen on Military Equipment. *Steel*, v. 129, Nov. 12, 1951, p. 76-79.

Types of units now available in the finishing industry. Advantages of hot spraying. (L26)

797-L. New Aluminum Polishing Compound. *Western Machinery and Steel World*, v. 42, Oct. 1951, p. 78, 103.

Compound developed by Ryan Aeronautical Co. is said to save metal by removing little of it during the process. Some indication of composition is given. (L10, Al)

798-L. Finishing Techniques Follow Assembly Line Pattern to Achieve High Standards. Howard E. Jackson. *Western Metals*, v. 9, Oct. 1951, p. 26-27.

Procedures followed at Westinghouse Electric Corp.'s Seattle, Wash., branch for finishing various metal parts. (L general)

799-L. Progress of Tin-Zinc Alloy Plating. *Wire Industry*, v. 18, Oct. 1951, p. 885.

Progress in commercial application of the process. (L17, Sn, Zn)

800-L. Pickling Accelerators. (In French.) G. Rossi-Landi. *Métallurgie et la Construction mécanique*, v. 83, Sept. 1951, p. 687, 689.

The nature of pickling and of the role of inhibitors and accelerators as applied to steel. Certain iron salts are suggested as accelerators.
(L12, ST)

801-L. Pickling of Copper and Its Alloys by Ferric Sulfate. (In French.) Jean Bary. *Métallurgie et la Construction mécanique*, v. 83, Sept. 1951, p. 689.

Advantages of using ferric sulfate. Details of temperature and composition of the bath. (L12, Cu)

802-L. Advances in the Technique of Enameling With Special Emphasis on the Cast-Iron Enameling Industry. (In German.) H. J. Karmaus. *Giesserei*, v. 38 (new ser., v. 4), Aug. 23, 1951, p. 397-401.

Surveys journal and patent literature on cast irons suitable for enameling, methods of cleaning cast iron, new materials and processes for enameling, enameling furnaces, and test methods. 18 ref. (L27, CI)

803-L. Effect of Anode Shape on Uniformity of Nickel Electrodeposition. (In German.) D. Mojert. *Metall*, v. 5, Sept. 1951, p. 388-392.

Perforated and grid-type anodes produce a more uniform deposit of Ni than non-perforated anodes. However, the latter type is used to advantage in plating perforated sheet metal. Perforated anodes also reduce time of Ni plating. (L17, Ni)

804-L. Corrosion Resistance of Sprayed Austenitic Materials. (In German.) Otto van Rossum. *Metalloberfläche*, sec. A, v. 5, Aug. 1951, p. A113-A115.

Experiments in which austenitic Cr-Ni-Mo steel was sprayed onto a tube, then separated from the tube.

and examined for its hardness, microstructure, and resistance to corrosion in different reagents. (L23, R general, SS)

805-L. Effect of Spraying Condition on the Grain Size of Sprayed Metal Coatings. (In German.) Paul Koch. *Metalloberfläche*, sec. A, v. 5, Sept. 1951, p. A129-A133.

Charted results of experiments indicate the need for continued experimentation, since the trend of results is too indefinite to permit the drawing of general conclusions. (L23)

806-L. Coatings for Fixed Steel Parts Submerged in Water. (In German.) *Metalloberfläche*, sec. A, v. 5, Sept. 1951, p. A143.

Results of a series of experiments on rust-inhibiting coatings show the superiority of a hot mixture of bituminous coal-tar pitch and microasbestos. Rust-inhibiting properties of other types of coatings. (L26, ST)

807-L. Copper Deposits From Hot Potassium Cyanide Baths. (In German.) Richard Erdmann. *Metalloberfläche*, sec. B, v. 3, Aug. 1951, p. B118-B119.

Thickness of Cu deposits can be increased by adding NaK tartrate to the bath. (L17, Cu)

808-L. Effect of Blinding on the Cathodic Dispersion of Metal in Galvanic Baths. (In German.) J. Steiner and K. Schery. *Metalloberfläche;* sec. B, v. 3, Sept. 1951, p. B129-B132.

Refers to partial blocking of the holes in screens around the cathodes. Experiments show that metal dispersion can be considerably controlled by type of screen, size of screen hole, and distance of the screen from the cathode. Optimum cathode arrangement greatly reduces effect of electrolyte composition. (L16)

809-L. Effect of Aluminum as an Alloying Element in Refined-Zinc Baths on the Quality of High-Carbon Hot-Galvanized Steel Wires. Heinz Gallbach and Anton Pomp. *Stahl und Eisen*, v. 71, Aug. 2, 1951, p. 805-816; disc., p. 816-817.

Experiments made to determine effect of carbon content of steel, area reduction, heat treatment, time of galvanizing, and Al content of the bath on quality of galvanized steel. Results show that Al has an undesirable effect on the bending strength of the wires. (L16, ST, Al, Zn)

810-L. Effect of Ultrasonics on Electrolytic Processes. III. Effect of Frequency on the Stirring Action of Ultrasonics. (In German.) Albert Roll and Gerhard Schrag. *Zeitschrift für Metallkunde*, v. 42, July 1951, p. 197-201.

To test the assumption that effect of ultrasonics depends on intensity rather than on frequency, experiments were made at 560,000; 34,000; 15,000; and 100 c.p.s. on deposition potentials of Ni. Results show a decreasing stirring effect with increasing frequency. (L17, C23, Ni)

811-L. Effect of Ultrasonics on Electrolytic Processes. IV. Effect of Ultrasonics on Bright Nickel Plating. (In German.) Albert Roll. *Zeitschrift für Metallkunde*, v. 42, Aug. 1951, p. 238-243.

The application of ultrasonic frequencies (34,000 c.p.s.) increases the required current density from 2.7 to 40 ma. per sq. cm. Motion of the metal ions in the ultrasonic field was studied. Photographs show effects of ultrasonics on Ni electrodeposits. (L17, Ni)

812-L. Effect of Ultrasonics on Electrolytic Processes. V. The Effect of Ultrasonics on the Properties of Electrodeposited Metals. (In German.) Albert Roll. *Zeitschrift für Metallkunde*, v. 42, Sept. 1951, p. 271-273.

Effect of ultrasonics on surface condition, crystal structure, and microhardness of the metal deposits. The vibrations have no effect unless the frequency is high enough to cause formation of standing waves. Work was done on Ag and Ni deposits. High intensity may damage the surface. 10 ref. (L17)

813-L. Ceramics and Special Alloys: A Metallurgical Investigation at Elevated Temperatures. Wilson G. Hubbell. *Aeronautical Engineering Review*, v. 10, Nov. 1951, p. 24-30.

See abstract of "Ceramic Coatings for the Hot Spots", *Finish*, item 781-L, 1951. (L27)

814-L. The Rate of Pickling Test for Tin-Plate Steels and Its Metallurgical Significance. E. L. Koehler *American Society for Metals*, Preprint 7W, 1951, 15 pages.

"Pickle lag", determined by the rate of pickling test, is a phenomenon in tinplate steels which is associated with poor internal corrosion resistance of tin cans. It is traced to the occurrence of grain-boundary oxides in the surface layers of the steel. These are developed during box annealing in an atmosphere which is not oxidizing to ferrite grains, but is oxidizing to the grain boundaries. Improved, rapid test for pickle lag. (L17, R11, CN)

815-L. Tests Prove Value of Ceramic Coatings. Wilson G. Hubbell. *Automotive Industries*, v. 105, Nov. 1, 1951, p. 48-50, 114, 116.

Study discloses the intimate metallurgical changes which occur in ceramic-coated exhaust manifolds at elevated temperatures. By the means of photomicrographs, spectograms, and microhardness readings, significant advantages which ceramic coatings provide are proven. No deterioration by oxidation, carbon absorption, or corrosion attack was found in ceramic-protected exhaust headers tested in actual flight for periods up to 1623 hr. (L27, SG-h)

816-L. Deburring Precision Parts by Wet Tumbling Method. Herbert Chase. *Automotive Industries*, v. 105, Nov. 1, 1951, p. 51-53, 83, 86. **Gears and Stampings De-Burred by Wet Tumble Grinding.** Herbert Chase. *Magazine of Tooling and Production*, v. 17, Nov. 1951, p. 48-49, 88, 90, 92.

Roto-Finish procedure, equipment, and applications. (L10)

817-L. A Corrosion-Inhibitive Coating for Buried Lead-Covered Cables. Wiley D. Sanderson. *Corrosion* (News Section) v. 7, Nov. 1951, p. 1-2.

Use of clay-base asphalt emulsion. Diagrams show method of installation. (L26, Pb)

818-L. Technical Development in Germany. I. J. I. Cordwell. *Industrial Gas* (London), v. 24, Sept. 15, 1951, p. 6-9; Oct. 20, 1951, p. 6-8. (Supplements to *Gas World*, v. 134.)

Reviews a recent work of A. Duphorn from *Stahl und Eisen*, v. 70, No. 15, on design, development, and operational results of gas-fired wire heating and galvanizing furnaces in Germany. (L16, J general, Zn, CN)

819-L. Dragout Control. Part I. Joseph B. Kushner. *Metal Finishing*, v. 49, Nov. 1951, p. 59-61, 64.

Dragout is defined as the volume of solution carried over the edge of a plating or dip tank by an emerging piece of work. Theory in the control and reduction of dragout losses from plating solutions. (To be continued.) (L17)

820-L. The Protection of Metallic Surfaces by Chromium Diffusion. Part III. Structure of Chromised Coatings. R. L. Samuel and N. A. Lockington. *Metal Treatment and Drop Forging*, v. 18, Oct. 1951, p. 440-444.

Temperature of the treatment is shown to be important in its effect on grain size of the coating and the core. Effect of carbon and other alloying elements on the final structure. Covers both mild and alloy steels. (To be continued.) (L15, Cr, ST)

821-L. Cleaning and Preparation of Metals for Electroplating. I. Degreasing Evaluation Tests: Sequential Testing. Henry B. Linford and Edw. B. Saubestre. *Plating*, v. 38, Nov. 1951, p. 1157-1161.

The relative sensitivity of various degreasing-evaluation tests is determined by means of "sequential testing". In this type of testing, a panel is consecutively examined by means of a series of tests. Compares performance of various degreasing-evaluation tests and obtains a measure of their relative sensitivities. (To be continued.) (L12)

822-L. Surface Treatment of Aluminum and Its Alloys (Continued.) (In French and German.) B. Mauderli. *Aluminium Suisse*, Sept. 1951, p. 180-190.

Electrolytic oxidation and electrodeposition of metallic coatings. Effects of faulty treatment. (To be continued.) (L17, L14, Al)

823-L. New Information on Surface Protection of Heat Resistant Structural Materials. (In German.) Arno Staerker, *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.*, v. 28, Aug. 1951, p. 390-395.

Corrosion resistance of steels, carbides, and other metals coated with Vanal (a ceramic composition containing Al and V) is greatly improved as the result of reduced surface tension. Includes test-specimen photographs and tabular data. (L27, ST)

824-L. (Book) **Galvanotechnik.** (Electroplating.) Ed. 9. Vols. I and II. R. Bilfinger, G. Elssner, A. Gabler-Gumbert, K. Gürtelmeier, F. Fox, E. Krause, O. Müller, R. Radenhausen, R. Springer, M. Völcker, and H. Weissensee. 1716 pages. 1949. Akademische Verlagsgesellschaft Geest & Portig, K. G. Leipzig, Germany.

This handbook, formerly known under the name Pfanhauser, deals comprehensively with theory and practice of electroplating (including deposition of metals and non-metals). (L17)

825-L. (Book) **Galvanotecnica.** (Electrodeposition Technology.) Ed. 2. Eugenio Bertorelle. 762 pages. 1951. Urico Hoepli, Milan, Italy.

Theoretical basis, general technique, and practice of electroplating, galvanoplastics, anodic oxidation of Al. Electrochemical processes and the specialized chemistry involved in the field. 29 ref. (L17, L18, C23)

M

METALLOGRAPHY, CONSTITUTION AND PRIMARY STRUCTURES

295-M. Correlation of Structure and Test-Bar Properties of 85-5-5-5 Alloy. J. G. Kura and L. W. Eastwood. *Foundry*, v. 79, Nov. 1951, p. 110-115.

Third of a series based on investigations sponsored by the Brass and Bronze Ingot Institute shows that variations in properties of 85-5-5-5 alloy test bars are a result of differences in structure. Micrographs and tabular data. (M27, Q general, Cu)

296-M. Structure of Oxide Replica for Electron Microscopy. Shigeto Yamaguchi. *Journal of Applied Physics*, v. 22, Oct. 1951, p. 1295-1296.

The oxide films formed on met-

als and able to reprint faithfully their surface forms are called "structureless". Shows that the "structureless" oxide film formed on the etched surface of iron single crystals is composed of oriented crystals of small size (50-100 A). (M21)

297-M. The Equilibrium Diagram of the System Nickel-Manganese. B. R. Coles and W. Hume-Rothery. *Journal of the Institute of Metals,* v. 80, Oct. 1951, p. 85-92.

The diagram above 800° C. was determined by a combination of thermal, microscopic, and X-ray methods; some information about the diagram at lower temperatures was also obtained. The diagram in some respects resembles that of the system Ni-Zn, which suggests that Mn acts as a divalent element in some of the alloys. (M24, Ni, Mn)

298-M. A New High-Resolution System of Autoradiography. Henry J. Gomberg. *Nucleonics,* v. 9, Oct. 1951, p. 28-43.

Called "wet-process autoradiography," new system of radiation detection offers one-micron resolution with simple equipment. Single-cell studies and metal grain structure are examples of tracer research for which it is suited. 12 ref. (M23)

299-M. Is Pro-Eutectoid Ferrite or Cementite Continuous With Pearlite Ferrite or With Cementite? (In Swedish.) S. Modin. *Jernkontorets Annaler,* v. 135, no. 4, 1951, p. 169-174.

Three hypo-eutectoid and one hypereutectoid steel, all with a coarse pearlite structure, were investigated microscopically. In the former steels it was found that pro-eutectoid ferrite was often continuous with ferrite of pearlite. This does not agree with the observations of Mehl and his collaborators. It is further shown that, in the hypereutectoid steel, the pro-eutectoid cementite is not always continuous with the pearlite cementite. (M26, ST)

300-M. Influence of Grain Boundaries on the Plastic Properties of Metals. F. R. N. Nabarro. "Some Recent Developments in Rheology", United Trade Press (London), 1950, p. 38-52.

Includes a literature survey on existing viewpoints. Diagrams. 39 ref. (M27, Q24)

301-M. A Method of Exact Analysis of the Shape of Stress-Strain Curves. Application to the Role of Inter-Granular Boundaries and Impurities. (In French.) C. Crussard. "Some Recent Developments in Rheology", United Trade Press (London), 1950, p. 53-62.

Includes results of an experimental investigation. (M27, Q27)

302-M. Inorganic Replication in Electron Microscopy. C. J. Calbick. *Bell System Technical Journal,* v. 30, Oct. 1951, pt. 1, p. 798-824.

The process of evaporated film formation as it is related to properties important in microscopy. In principle, any material of suitable physical and chemical properties may be used for evaporated replica films. Micrographs of silica, Cr, goldmanganin, Al, Al-Pt-Cr, and Ge replicas. 23 ref. (M21)

303-M. Chromium-Nickel Phase Diagram. David S. Bloom and Nicholas J. Grant. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1009-1014.

Investigation of the Cr-Ni system revealed that there is a eutectoid transformation at about 1180° C. The transformation in Cr implied by the eutectoid reaction was detected at about 100° C. below its melting point. Associated with the eutectoid transformation, a metastable transition structure was found. Phase diagrams and micrographs. (M24, Cr, Ni)

304-M. Metallographic Techniques for Austenite Grain Size of Steels in the As-Cast State. Edward A. Loria. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1029-1030.

In steels exhibiting temper brittleness, it has been found that addition of the wetting agent, Zephiran chloride, to a modified picral etch reveals a precipitate not shown by other etching reagents. Best results were obtained by use of 1% Zephiran chloride in 6% nital. Results are illustrated by macrographs. (M28, CI)

305-M. Transitions in Chromium. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1066-1067.

Discussion of above paper (by M. E. Fine, E. S. Greiner, and W. C. Ellis). (Jan. 1951 issue. See item 16-M, 1951.) (M26, P10, P11, P15, Q21, Cr)

306-M. Atomic Relationships in the Cubic Twinned State. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1070-1074.

Discussion of above paper (by W. C. Ellis and R. G. Treuting). (Jan. 1951 issue, see item 15-M, 1951.) (M26)

307-M. Effect of Strain Hardening and Tempering on 18/8 Stainless Steels. P. Bastien, J. Dedieu and A. Portevin. *Metal Treatment and Drop Forging,* v. 18, Oct. 1951, p. 465-468.

Metallographic technique using a fine suspension of the magnetic oxide of iron to differentiate between α-phase and austenite in 18-8 stainless steels and its use to study the effect of strain hardening and tempering. (M23, J29, SS)

308-M. Diffuse X-Ray Scattering by Disordered Binary Alloys. II. William J. Taylor. *Physical Review,* ser. 2, v. 84, Oct. 1, 1951, p. 148-149.

Extends mathematical analysis, presented by the same author. See item 120-M, 1951. (M22)

309-M. New Reagents for the Purpose of Revealing the Micrographic Structures of Steel by the Formation of Colored Films. (In French.) Louis Beaujard. *Compets Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Sept. 17, 1951, p. 653-655.

An alkaline reagent of a given composition was used. The various colorations reveal the physical and chemical heterogeneity of the metal. (M23, ST)

310-M. Nonmetallic Inclusions in Ferrochromium. (In French.) R. Zoja. *Revue de Metallurgie,* v. 48, Aug. 1951, p. 631-638.

Most samples were of the following compositions: Si, 3.66%; Mn, 0.27%; Cr, 52.6-97.3%; S, 0.005-0.027%; P, 0.010-0.059%; and carbon less than 1%. Structure, isothermal transformations of typical α- and β-type inclusions, and their chemical composition were particularly considered. Numerous micrographs and macrographs. (M27, M28, Fe-n)

311-M. Micrographic Etchant Designed to Show the Beginning of Intergranular Precipitation of Solid Solutions of Aluminum and Magnesium. (In French.) J. Hérenguel and M. Scheidecker. *Revue de Métallurgie,* v. 48, Sept. 1951, p. 659-664.

Experiments using two techniques: anodic oxidation; and chemical polishing in a phosphoric-sulfuric-nitric bath. The latter was of particular value for alloys containing 5% Mg. Typical results are illustrated by micrographs. (M21, Al)

312-M. The Stability of the Hexagonal Lattice Submitted to a Law of Simple Forces. (In French.) F. R. N. Nabarro and H. O. Varley. *Revue de Métallurgie,* v. 48, Sept. 1951, p. 681-683.

Theoretical discussion to decide whether the effects of the zones and of polarization would deform a formerly compact lattice, or whether the lattice has a non-compact equilibrium structure, even in the absence of these effects. Considerations are limited to central forces affecting neighboring atoms, and to "Fermi" energy, depending only on the volume. (M26)

313-M. Standards for Graphite Structures in Gray Iron. (In German.) C. W. Pfannenschmidt. *Giesserei,* v. 38 (new ser., v. 4), July 26, 1951, p. 355-359.

Includes numerous photomicrographs of different sizes and structures of graphite. (M27, E25, CI)

314-M. Investigation of Structure in the Third Dimension. (In German.) H. Klemm. *Metall,* v. 5, Aug. 1951, p. 337-341.

Mechanical and chemical erosion of polished surfaces was used in study of three-dimensional structure. Also a method for determining volume of individual constituents and average grain volume. (M27)

315-M. Metallography of the Light Metals. II. Differences in Texture Within the Cross Section of Pressed Forms. (In German.) Hans Kostron and Margarete Schippers. *Metall,* v. 5, Oct. 1951, p. 426-428.

Effect of different etches on the appearance of microstructures in an Al-Cu-Mg alloy containing 4.07% Cu and 0.6% Mg. (M21, Al)

316-M. The Structure of Copper-Silver-Indium System. I. Course of Equilibrium on the Copper-Silver Side. (In German.) Erich Gebhardt and Manfrid Dreher. *Zeitschrift für Metallkunde,* v. 42, Aug. 1951, p. 230-238.

Metallographic, thermal, and conductivity studies were made to determine the phase diagram of above system containing a maximum of 35% In. Includes constitution diagrams, photomicrographs, and tables. (M24, Cu, Ag, In)

317-M. The Gamma Phase of Manganese. I. The Effect of Additions on the Structure of Alloys Quenched From the Gamma Range to Room Temperature. (In German.) Ulrich Zwicker. *Zeitschrift für Metallkunde,* v. 42, Aug. 1951, p. 246-252.

Study on alloys of Mn with Ge, Ga, Zn, Cu, Ni, Pt, Fe, Ag, Co, As, Sb, Sn, In, Si, and Al. Constitution diagrams, tables, and graphs. 15 ref. (M24, Mn)

318-M. Constitution Diagrams of the Iron-Antimony-Sulfur and Cobalt-Antimony-Sulfur Systems. (In German.) Werner Lange and Heinz Schlegel. *Zeitschrift für Metallkunde,* v. 42, Sept. 1951, p. 257-268.

Experimental procedure, the alloys being studied by thermal, microscopic, and X-ray analysis. Tables, graphs, and photomicrographs. 15 ref. (M24, Fe, Co, Sb)

319-M. Research on the Manganese-Nitrogen System. (In German.) Ulrich Zwicker. *Zeitschrift für Metallkunde,* v. 42, Sept. 1951, p. 274-276.

Experiments on the phase diagram of the Mn-Ni system. Properties and microstructure of various compositions in the system. Includes phase diagram, photomicrographs, and tables. (M24, Mn, N)

320-M. Micro-X-Ray Investigation of the Distribution of Alloying Elements in Nickel Solid Solutions. (In Russian.) K. A. Osipov and S. G. Fedotov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 78, May 1, 1951, p. 51-53.

X-ray micrographic investigation of Ni-W, Ni-Mo, Ni-Cb, Ni-Ti, and

Ti-Ta alloys showed that significant inhomogeneity in the distribution of components is retained in the grains of the single-phase solid solution containing 5 at. % of the alloying elements after protracted heating at 950 and 1100° C. (M23, Ni)

321-M. A Recording Dilatometer for High Temperatures. W. R. Apblett and W. S. Pellini. *American Society for Metals,* Preprint 2W, 1951, 15 pages.

A novel method permits extension of dilatometry to temperatures considerably in excess of the present practical limits of 1800° F., with concomitant flexibility of heating rate. The method consists of electrical resistance heating of a small rod-like specimen. Temperatures and resulting dilations are recorded by means of thermocouples and SR-4 clip gages, respectively. Heating rates of 500° F. per sec. are readily attainable. Data are presented for the linear expansion of various high-temperature alloys to 2400° F., Mo to 3000° F., and W to 4760° F. Applicability to transformation studies over a wide range of temperatures is demonstrated.
(M23, P11, Mo, W, SG-h)

322-M. The Structure of $ZrMo_2$. Pol Duwez and Charles B. Jordan. *Journal of the American Chemical Society,* v. 73, Nov. 1951, p. 5509.

Preparation procedure and powder-pattern measurements. Calculated relative intensities were found to be in very good agreement with those estimated visually from powder patterns. Proposes that the intermediate phase in the Zr-Mo system has the ideal stoichiometric composition $ZrMo_2$.
(M24, M26, Zr, Mo)

323-M. Electropolishing of Metallographic Specimens. (In Dutch.) J. W. Holleman and W. A. Schultze. *Metalen,* v. 6, Aug. 31, 1951, p. 306-311.

Surveys current theories. Development of an electrolyte with good polishing features and satisfactory throwing power. The principle of a jet of liquid, spurting from the cathodic nozzle against the specimen was successfully used for polishing of nitrided cases and other diffusion layers. A time-saving unit was designed for polishing the entire surface of a $\frac{5}{8}$-in. micrograph. (M21)

324-M. A Simple Method of Preparing Large Areas of Transparent Films of Aluminum Oxide Ranging in Thickness from 50 to 300 Mu. (In German.) Karl Strohmaier. *Zeitschrift für Naturforschung,* v. 6a, Sept. 1951, p. 508-509.

Procedure for use as replicas in electron microscopy. (M21)

325-M. Index of Refraction of Thin Al_2O_3 Films. (In German.) Walter Weiskirchner. *Zeitschrift für Naturforschung,* v. 6a, Sept. 1951, p. 509-510.

Immersion method of determining index of refraction with an average accuracy of ± 0.0005. The films are used as replicas in electron microscopy. (M21, P17)

326-M. "Cube Position" of Cubic Face-Centered Metals. (In German.) E. Schmid and H. Thomas. *Zeitschrift für Physik,* v. 130, Aug. 20, 1951, p. 293-303.

Study on 50-50 Ni-Fe and Cu rolled to extremely thin bands. Diagrams, tables, and graphs. 20 ref.
(M26, Ni, Fe, Cu)

327-M. Autoradiographic Investigation of Lead Distribution in 18-8 Steel. (In Swedish.) L. G. Erwall, A. Franzen, and M. Hillert. *Jernkontorets Annaler,* v. 135, No. 6, 1951, p. 219-228.

Distribution of Pb in stainless steel containing 0.004% Pb was studied by means of autoradiography using the lead isotope $ThB(Pb^{212})$ as indicator. The autoradiographs were studied and compared with the etched steel surface at various magnifications up to 400X. The radioactive material was found to be situated in the last parts of the specimen to solidify, i.e., between the dendrites. It is, however, not uniformly distributed over these parts but occurs to a large extent grouped in isolated aggregates. (M23, SS)

328-M. (Book) **Der metallische Zustand.** (The Metallic State.) Johannes Kramer. 147 pages. 1950. Vandenhoeck and Ruprecht, Göttingen, Germany.

Results of a decade of basic research. The metallic state is discussed from the point of view of the nonmetallic phase which is defined as the phase of a metal which lacks certain properties (such as conductivity) which usually are characteristic of metals. An entirely new method of releasing electrons from metals using the energy of exothermic processes in the metals, which appears to be a sensitive, yet simple, method of observing transformations, for detecting deviations from the most stable state of the metal, and for determining effects of working, deformation, wear, and stress. Investigations were made using Geiger counters on various ferrous and nonferrous metals and alloys. 47 ref.
(M general, N general)

N

TRANSFORMATIONS AND RESULTING STRUCTURES

269-N. Diffusion in Grain Boundaries and Their Structure. M. R. Achter and R. Smoluchowski. *Journal of Applied Physics,* v. 22, Oct. 1951, p. 1260-1264.

See abstract of "Anisotropy of Diffusion in Grain Boundaries," *Physical Review,* item 171-N, 1951.
(N1, Ag, Cu)

270-N. Preferred Orientation in Zirconium. R. K. McGeary and B. Lustman. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 994-1002.

Previously abstracted from *U. S. Atomic Energy Commission.* See item 104-N, 1951. (N5, Q24, Zr)

271-N. Grain-Growth and Recrystallization Characteristics of Zirconium. F. J. Dunkerley, F. Pledger, V. Damiano, and J. Fulton. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1003-1008; disc. p. 1008.

A commercially pure Zr prepared by the iodide process was used. Grain growth from 40 to 800° C. was continuous once initiated. Recrystallization occurred at 450 to 550° C. after deformations of 20 and 50%. Relative rates of recrystallization obtained are useful as a guide in fabrication practice.
(N3, N5, Zr)

272-N. Habit Phenomenon in the Martensitic Transformation. E. S. Machlin and Morris Cohen. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1019-1029.

Mathematical analysis as applied to 70-30 Fe-Ni alloys, plus experimental verification on single crystals grown from the melt. Results are shown by tables, graphs, and photomicrographs. 10 ref.
(N8, N12, Fe)

273-N. Crystal Structures and Transformations in Indium-Thallium Solid Solutions. *Journal of Metals,* v. 3, Nov. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 1951, p. 1056-1057.

Discussion of above paper (by Lester Guttman). (Dec. 1950 issue, see item 271-N, 1950.)
(N9, M24, In, Tl)

274-N. Crystallography of Cubic-Tetragonal Transformation in the Indium-Thallium System. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1057-1060.

Discussion of above paper (by J. S. Bowles, C. S. Barrett, and L. Guttman). (Dec. 1950 issue, see item 272-N, 1950.) (N9, N1, M24, In, Tl)

275-N. Interface and Marker Movements in Diffusion in Solid Solutions of Metals. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1060-1062.

Discussion of above paper (by Luiz C. Correa da Silva and Robert F. Mehl). (Feb. 1951 issue, see item 43-N, 1951.) (N1, Cu, Ag, Au)

276-N. Formation of Annealing Twins. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1068-1070.

Discussion of above paper (by J. E. Burke). (Nov. 1950 issue, see item 255-N, 1950.) (N5)

277-N. Note on Superlattices and Brillouin Zones. J. C. Slater. *Physical Review,* ser. 2, v. 84, Oct. 15, 1951, p. 179-181.

Theoretical discussion illustrated by several examples, especially Cu-Pt and Cu-Au alloys. Similarity of effects described to current theories of antiferromagnetism and of superconductivity. (N10, P16, Cu, Pt, Au)

278-N. Application of Radioactive-Tracer Technique to the Study of Diffusion in Solids. (In French.) Jean-Claude Hutter. *Bulletin de la Société Chimique de France,* July-Aug. 1951, p. 45D-52D.

Reviews and critically discusses literature on the technique and the results obtained. 94 ref. (N1, S19)

279-N. Multiple-Phase Diffusion and Its Metallurgical Application. (In French.) H. Bückle and J. Descamps. *Revue de Métallurgie,* v. 48, Aug. 1951, p. 569-578.

Investigated for a couple formed by high-purity Al and an Al-Be alloy, which latter is an aggregate of Be dispersed in a solid solution of Al-Be. Theoretical and experimental aspects of a new method; results are interpreted. 19 ref.
(N1, Al, Be)

280-N. The Three Mechanisms of Carbonitriding and Hardening. (In French.) Jacques Pomey, Francois Goutel, André Veragen, and René Le Roux. *Revue de Métallurgie,* v. 48, Sept. 1951, p. 665-680.

As applied to various stainless and low-alloy steels. The three mechanisms are: cementation in the austenite state, followed by bainite hardening of the core; carbonitriding above the A_{c_1} point followed by the pearlitic Ar' transformation of the interior metal; and cementation in the alpha state. Results of the various processes.
(N8, J26, J28, SS, AY)

281-N. Some Particular Questions on the Modern Thermal Treatment of Steels. (In French.) Andre Michel. *Revue Universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués a l'Industrie,* ser. 9, v. 94, Sept. 1951, p. 281-293.

Reviews literature. Relationship between the isothermal and anisothermal transformation curves of austenite, stabilization of austenite by aging, and application of S-curves to thermal treatment.
(N8, ST)

282-N. Research on the Austenite Transformation of Supercooled Alloyed Structural Steels. (In German.) Helmut Krainer and Max Kroneis. *Archiv für das Eisenhüttenwesen,* v. 22, July-Aug. 1951, p. 231-243; disc., p. 243-244.

Study was made on six structural steels alloyed with small percentages of Si, Mn, Cr, V, and Mo. Photomicrographs are arranged in their respective locations on time-temperature curves (S-curves) (N8, AY)

283-N. Research on Isothermal Austenite Transformation Upon Supercooling. (In German.) Erich Greulich. *Archiv für das Eisenhüttenwesen,* v. 22, July-Aug. 1951, p. 245-257, disc., p. 257-260.

Experiments made to study the isothermal austenite transformation of nine plain-carbon and six alloy steels quenched to 150° C. for different times. 26 ref. (N8, CN, AY)

284-N. Recrystallization Tests With a Commercial Al-Cu-Mg Alloy During Intermittent Heat Treatment. (In German.) E. Mohr. *Metall,* v. 5, Aug. 1951, p. 328-331.

In tests made by brief annealing at high furnace temperatures, special attention was paid to temperature gradient in test sample. Strength measurements were made to determine effect of spontaneous recrystallization on mechanical properties in the heterogeneous state. The alloy investigated contained 3.43% Cu and 0.59% Mg. (N5, Al)

285-N. Mobility in the Diffusion of Metallic Ternary Systems. (In German.) W. Seith and H. Wever. *Zeitschrift für Elektrochemie und angewandte Physikalische Chemie,* v. 55, July 1951, p. 380-384.

Since mobility rather than concentration gradient is the factor causing diffusion, it is proposed that irregular concentration-diffusion curves be replaced by mobility-diffusion curves. Data on diffusion of different elements in several carbon and alloy steels. 18 ref. (N1, CN, AY)

286-N. Measuring the Heat of Recrystallization of Thin Copper Wires. (In German.) Gerhard Bockstiegel and Kurt Lücke. *Zeitschrift für Metallkunde,* v. 42, Aug. 1951, p. 225-230.

Apparatus and procedure of three methods. Typical results. (N5, Cu)

287-N. A Transformation of the Mn_3Cr Phase in the Manganese-Chromium System. (In German.) Ulrich Zwicker. *Zeitschrift für Metallkunde,* v. 42, Sept. 1951, p. 277-278.

Study reveals two modifications of the Mn_3Cr phase. The transformation temperature is 975° C., and Mn_3Cr changes from the α to the β the volume is found to increase as phase. (N6, Mn, Cr)

288-N. Region of Primary Crystallization of the Q-Phase of the Al-Cu-Mg System. (In Russian.) M. S. Mirgalovskaya. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Apr. 21, 1951, p. 1027-1030.

Experimental investigation (structural and X-ray analyses) revealed the region of primary crystallization of the Q-phase and the nature of the non-variant processes in which it participates. (N12, M24, Al, Cu, Mg)

289-N. An Electrical Resistance Apparatus for Studying Transformations in Metals. Its Application to Transformations in Stainless Steel. William H. Colner and Otto Zmeskal. *American Society for Metals,* Preprint 5W, 1951, 11 pages.

The specimen, in the form of a wire, is heated and cooled in a furnace or heated by an alternating current and cooled by helium to the temperature of the furnace. Resistance of the specimen is continuously recorded. Data are reported on transformations in a precipitation-hardenable stainless steel. Effect on the austenite-ferrite transformation of solution temperature, rate of cooling, and interrupted cooling. Progress of transformation at room temperature was followed for austenites of varying stability. A mechanism is proposed to account for the optimum solution temperature. (N8, M23, SS)

290-N. Gamma Loop Studies in the Iron-Titanium, Iron-Chromium, and Iron-Titanium-Chromium Systems. William P. Roe and W. P. Fishel. *American Society for Metals,* Preprint 13W, 1951, 11 pages.

Dilation studies were carried out on a series of Fe-Ti, Fe-Cr, and Fe-Ti-Cr alloys in order to determine Ac_3 transformation temperatures. These data were then used to determine shape and outer limit of the gamma-loop curve for each of these systems. The regions studied contained not more than about 5% Ti and 12% Cr. 10 ref. (N8, M24, Fe, Ti)

291-N. Recrystallization and Grain Growth of Nickel. Glen W. Wensch and Harold L. Walker. *American Society for Metals,* Preprint 16W, 1951, 13 pages.

Grain sizes produced by recrystallization and grain growth of commercial purity Ni subjected to specified amounts of cold rolling and isothermally annealed for various times were studied. End points of recrystallization were determined by optical microscopy. The progress of grain growth was measured by determining average grain size after an isothermal anneal for different periods of time. Heats of activation for both recrystallization and grain growth were found. 13 ref. (N3, N5, Ni)

292-N. Grain Growth in High Purity Iron. George Wiener. *American Society for Metals,* Preprint 17W, 1951, 16 pages.

A study of grain-growth characteristics of high-purity Fe was made at temperatures from 600 to 875° C. after deformations of 20, 30, 40, 60, and 85%. By proper combination of cold work and heat treatment, it is possible to obtain any grain size up to a limiting value obtained at the highest temperature studied. It was found possible to relate the grain growth in iron by a simple parabolic time function. Effects of time, temperature, and plastic deformation on grain size and rate of grain growth were experimentally evaluated. (N3, Fe)

293-N. The Preparation of High Melting Point Metal Single Crystals and Bicrystals With Predetermined Crystallographic Orientation. K. V. Gow and B. Chalmers. *British Journal of Applied Physics,* v. 2, Oct. 1951, p. 300-303.

Crystals are grown horizontally in an atmosphere of argon; heating is by graphite-rod resistors. The method was applied to Cu and Ni. (N12, Cu, Ni)

294-N. Growth of Gray Cast Iron. (In Swedish.) Morris Itzel. *Gjuteriet,* v. 41, Aug. 1951, p. 113-116.

Main reasons for growth at elevated temperatures are decomposition of cementite and pearlite into ferrite and graphite; oxidation of Si and Fe; and cracking due to expansion and contraction of the casting. The influence of ordinary alloying elements on structure and growth. Different methods of preventing growth are suggested. 13 ref. (N8, CI)

DON'T MISS—

A.S.M. Midwinter Meeting

William Penn Hotel, Pittsburgh

Jan. 31-Feb. 1, 1951

P

PHYSICAL PROPERTIES AND TEST METHODS

338-P. Transformer Iron Losses. N. H. Crowhurst. *Electronic Engineering,* v. 23, Oct. 1951, p. 396-403.

For power transformers it is generally adequate to specify the total loss at the operating frequency and to consider the temperature rise which this loss is likely to produce, according to the type of design employed. In the design of audio-frequency transformers, however, it is necessary to know more about the characteristics of the iron, in order to determine the response which the component will produce in association with the circuits to which it is connected. Charts enable a more complete analysis of the behavior of the iron to be made quite readily for two materials in common use: ordinary grade transformer iron in laminations 0.016 in. thick, and also Mumetal in laminations 0.015 in. thick. (P16, Fe, Ni)

339-P. Electrical Properties of Selenium. II. Microcrystalline Selenium. H. W. Henkels. *Journal of Applied Physics,* v. 22, Oct. 1951, p. 1265-1278.

Dependence of electrical properties on history of preparation, i.e., as functions of temperature of initial liquid Se, quench procedure, nucleation procedure, temperature of crystallization, and time of crystallization. Electrical properties of melt single crystals and the microcrystalline matrix were compared. Influence of the nonmetals S, O_2, I_2, in small quantities, on electrical properties. Carrier densities and effective mobilities as functions of temperature of measurement were estimated from data on thermoelectric powers and resistivities. Frequency dependence of resistivity was determined. (P15, Se)

340-P. AC Characteristics of Si p-n Junction. Sakuji Komagata, Mitio Hatoyama, Motoichi Shibuya, Wataru Sasaki, Takaaki Yamamoto, and Makoto Kikuchi. *Journal of Applied Physics,* v. 22, Oct. 1951, p. 1290.

Some ingots prepared from silicon, containing small amounts of unknown impurities, were found to be partly of p-type and partly of n-type. Several samples of p-n junctions were cut from these ingots and their characteristics studied. (P15, Si)

341-P. Catalysis by Metal Powders. Donald P. Smith. *Journal of Applied Physics,* v. 22, Oct. 1951, p. 1291-1292.

Proposes an explanation which regards the metal powder as strained metal in small masses, and attributes its activity to the same characteristics of widened lattice intervals which are evident in large masses, instead of to special properties of surfaces and adsorbed layers. (P13)

342-P. The Electrical Resistivity of Cold-Worked Copper-Iron Alloys. F. E. Hetherington and James Reekie. *Journal of Applied Physics,* v. 22, Oct. 1951, p. 1293-1294.

Measurements were made on a series of alloys of Cu with small amounts of Fe, the alloys being used both in the annealed state and after various degrees of cold working carried out by drawing through dies. Conclusions are drawn regarding behavior of Fe impurity when subjected to stress in the metal. (P15, Cu)

343-P. A Method for Determining the Energy Stored During Cold-Working of Metals. M. B. Bever and L. B. Ticknor. *Journal of Applied Physics,* v. 22, Oct. 1951, p. 1297-1298.

New calorimetric method employs the fact that heats of solution are small in some metallic systems, especially compared to heats of solution of metals in aqueous media. Initial work was carried out with Sn as solvent and additions of Ag and Au-Ag alloy in the annealed and cold worked state. (P12)

344-P. Optical Absorption and Photoconductivity of Amorphous and Hexagonal Selenium. M. A. Gilleo. *Journal of Chemical Physics,* v. 19, Oct. 1951, p. 1291-1297.

Dependence of these properties on temperature. Apparatus and results. 36 ref. (P17, Se)

345-P. Experimental Investigation of Forced-Convection Heat-Transfer Characteristics of Lead-Bismuth Eutectic. Bernard Lubarsky. *National Advisory Committee for Aeronautics,* Research Memorandum E51GO2, Sept. 20, 1951, 30 pages.

Data were obtained for heat addition to Pb-Bi flowing in a circular tube and in an annulus with heat extraction from the inner surface. The effect on the heat-transfer characteristics of adding a wetting agent (Mg) was investigated. (P11, Pb, Bi)

346-P. High-Temperature Properties and Characteristics of a Ferritic Steam-Piping Steel. A. W. Rankin and W. A. Reich. *Transactions of the American Society of Mechanical Engineers,* v. 73, Oct. 1951, p. 891-898; disc., p. 898-904.

Previously abstracted from *American Society of Mechanical Engineers,* Paper 50-A-76, 1950. See item 103-P, 1951.
(P general, Q general, AY, SG-h)

347-P. A New Method of Determining Thermal Diffusivity of Solids at Various Temperatures. D. Rosenthal and A. Ambrosio. *Transactions of the American Society of Mechanical Engineers,* v. 73, Oct. 1951, p. 971-974.

The theory of moving heat sources is the basis for the method. A long prismatic bar is heated by a moving point heat source. Temperature-time history at a single point of the bar is determined, using two different heat-source velocities. The method was tried on a commercial "yellow" brass tube. The first equation developed for calculation of thermal diffusivity proved unworkable, hence a second equation based on different assumptions was developed. This equation gave values in the range 100-400° C. reproducible within ± 3%. (P11)

348-P. Path-Length Problems of Electrons in Metals and Semiconductors. (In German.) E. Justi, M. Kohler, and G. Lautz. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft,* v. 3, 1951, p. 34-43.

In general the electrical resistivity of metal specimens does not depend on their size. At low temperatures, however, the mean free path of the electrons can be comparable with the dimensions of the specimens. Shows that there is a discrepancy between the formulas of K. Fuchs and R. B. Dingles and the experimental results of van den Berg and hitherto unpublished measurements of the author for gold at liquid-helium temperatures. Explains the discrepancy by the increase of residual resistivity with cold working of the surface layer and therefore by enlargement of the effective surface area. Resistivity measurements on cylindrical specimens of Mylius gold, perhaps the purest metal ever obtained. (P15, Au)

349-P. Hall Effect and Electron Configuration of the Noble Metals. (In German.) E. Justi and M. Kohler. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft,* v. 3, 1951, p. 44-48.

In previous papers the authors reported new precise measurement of Hall coefficients of Cb, Re, Ru, Rh, Ir, and new values for Cu, Ag, Au. These coefficients show a monotonic change from high positive to high negative values with increasing atomic number in each period of the periodic system. These results can be explained satisfactorily in terms of a two-band-model according to Mott. Quantitative evaluation of the measured values gives some results for the different configuration of electrons in the free and the crystalline state of these metals.
(P15, M25, EG-a)

350-P. The Behavior of the Thermoelectric Effect at Very Low Temperatures. (In German.) Max Kohler. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft,* v. 3, 1951, p. 49-54.

The thermo-electric phenomena of electronic conductors are considered using only the three principal laws of thermodynamics. The theory developed explains the hitherto reported discrepancies between the thermodynamic and the electron theoretical treatment of thermo-electric phenomena. (P15)

351-P. Dependence of the Effect of Thermomagnetic Treatment on Initial Properties of Ferromagnetic Materials. (In Russian.) A. A. Lukshin and Ya. S. Shur. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 78, May 11, 1951, p. 243-244.

Since thermomagnetic treatment causes certain changes in crystal lattice, it is theorized that the effect of such treatment depends on initial state of the crystal lattice. The theory was confirmed by experimental work on 66-Permalloy and "Alsifer" (5.5% Al, 9.5% Si, rest Fe). (P16, Ni, Fe, SG-n, p)

352-P. Problem of the Energies of Formation and Phase Transformations of Al-Zn Alloys. (In Russian.) V. S. Lyashenko. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Chemical Sciences, May-June 1951, p. 242-254.

Method of determination during continuous heating in a reducing atmosphere. Heat capacities above the liquidus temperature and heats of phase transformation were measured for 14 different Al-Zn alloys. Critical points were determined and the Al-Zn constitution diagram plotted. An equation for change of free energy during formation of the alloy from the elements is set up. Experimental data are tabulated and charted. 10 ref.
(P12, N6, M24, Al, Zn)

353-P. Laws Governing Rate of Solution of Metals in Concentrated Acids. I. (In Russian.) Ya. V. Durbin. *Zhurnal Obshchei Khimii* (Journal of General Chemistry), v. 21, (83), May 1951, p. 801-808.

The cause of a maximum on the rate vs. concentration curves for metals in concentrated acids, and lack of connection with the maximum on electroconductivity vs. concentration curves. Solution of Cr in HCl was studied as an example. Reactions at the metal surface at different concentrations were found to be determining factors in rate of solution. 15 ref. (P13)

354-P. Electron Transmission Through Thin Metal Sections With Application to Self-Recovery in Cold Worked Aluminum. R. D. Heidenreich. *Bell System Technical Journal,* v. 30, Oct. 1951, pt. 1, p. 867-887.

An interpretation of electron interference phenomena occurring in thin metal sections particularly as it pertains to structural changes accompanying plastic deformation. New data concerning the effect of temperature on the polygon or domain size in cold worked Al. 11 ref. (P15, Q24, Al)

355-P. On the Reflection of Electrons by Metallic Crystals. L. A. MacColl. *Bell System Technical Journal,* v. 30, Oct. 1951, pt. 1, p. 888-906.

Results of some calculations of the reflection coefficient for electrons incident normally on a plane face of a metallic crystal. The physical situation is treated as being one-dimensional; and it is assumed that the potential energy of an electron is a sinusoidal function of distance inside the crystal, and obeys the classical image force law outside of the crystal. Data are graphed (P15)

356-P. The Use of the Field Emission Electron Microscope in Adsorption Studies of W on W and Ba on W. J. A. Becker. *Bell System Technical Journal,* v. 30, Oct. 1951, p. 907-932.

The technique and its significance for the study of adsorption phenomena basic to thermionic, photoelectric, and secondary emission, also to catalysis and to biological processes. The field-emission microscope tube, also field emission from a paraboloidal surface of a W single crystal, effect of temperature in determining size of 110, 211, and 100 planes, effect of high fields and temperature in determining surface configuration, and effect of temperature in changing an abnormal to a normal pattern. Emission and absorption properties of B on W. Includes numerous field-emission patterns. (P13, W)

357-P. Frequency Dependence of Elastic Constants and Losses in Nickel. R. M. Bozorth, W. P. Mason, and H. J. McSkimin. *Bell System Technical Journal,* v. 30, Oct. 1951, pt. 1, p. 970-989.

The elastic constants of Ni crystals, and their variation with magnetic field (ΔE effect), were measured by a 10-mc. ultransonic pulsing method. The constants of three crystals agree well with one another when the crystals are magnetically saturated, but vary with domain distribution when demagnetized. By measuring the ΔE effect and the decrement of polycrystalline rods at low frequencies, it is shown that the small effect observed at 10 mc. is due to a relaxation in the domain wall motion due to micro eddy-current damping. 13 ref. (P16, Ni)

358-P. The Free Energy Diagram of the Vanadium-Oxygen System. N. P. Allen, O. Kubaschewski, and O. von Goldbeck. *Journal of the Electrochemical Society,* v. 98, Nov. 1951, p. 417-424.

The slope of the energy curve at low concentrations of oxygen was determined by establishing equilibria between vanadium-oxygen solutions and molten barium, magnesium, or calcium. The O_2 contents in V thus obtained were determined by the vacuum-fusion method. With these results the free-energy curve for V-O_2 was completed. The results further suggest that the solubility of O_2 in V is much lower than has been assumed hitherto. 26 ref.
(P12, V)

359-P. Free Energy of Formation of Cementite and the Solubility of Cementite in Austenite. L. S. Darken and R. W. Gurry. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1015-1018.

Solubility of cementite in austenite was computed by thermodynamic methods from observed solubility of graphite. It was found to be greater than that of graphite in the entire austenite temperature range. Thus prior discrepancy between this portion of the phase diagram and the observed metastability of cementite is partially resolved. 20 ref.
(P12, M24, ST)

360-P. Thermodynamic Study of the Reaction $CaS + H_2O \rightleftarrows CaO + H_2S$ and the Desulphurization of Liquid Metals With Lime. *Journal of Metals,* v. 3, Nov. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1047-1048.

Discussion of above paper (by Terkel Rosenqvist). (July 1951 issue, see item 227-P, 1951.) (P12, Cu, Fe)

361-P. Ignition Temperatures of Magnesium and Magnesium Alloys. *Journal of Metals,* v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1075-1076.

Discussion of above paper (by W. Martin Fassell, Jr., Leonard B. Gulbransen, John R. Lewis, and J. Hugh Hamilton). (July 1951 issue, item 226-P, 1951.) (P12, Mg)

362-P. Influence of Certain Surface-Active Compounds on the Hydrogen Overvoltage of Platinum and Copper. R. D. Misch and R. B. Bernstein. *Journal of Physical & Colloid Chemistry,* v. 55, Nov. 1951, p. 1401-1409.

Further information on the hydrogen-discharge process where various foreign species are present at low concentration in the electrolyte. The linearity of the H_2 overvoltage vs. log current density relationships were verified for Pt and Cu. A rapid recording apparatus is described. (P15, Pt, Cu)

363-P. The Impedance Concept in Thin Film Optics. Paul J. Leurgans. *Journal of the Optical Society of America,* v. 41, Oct. 1951, p. 714-717.

The one-to-one correspondence between transmission line theory and the theory of the optical behavior of thin films is discussed. Advantage is taken of this analogy to apply the methods developed for the solution of transmission-line problems involving transparent dielectric films. A variation of the method is used to derive a new way of obtaining the optical constants of opaque metal films. (P17)

364-P. Optical Constants of Germanium, Silicon, and Pyrite in the Infrared. Ivan Simon. *Journal of the Optical Society of America,* v. 41, Oct. 1951, p. 730.

Possibility of applying the reflection method to the investigation of the optical properties of semiconductors. The method involves measurement of the reflecting power of the plane, polished surface of a bulk sample at two different angles of incidence. The advantage of the method lies in the ease of preparation of samples and its applicability in a wide wavelength interval. (P17, Ge, Si)

365-P. The Electrical Conductivity of Liquid Germanium. Robert W. Keyes. *Physical Review,* ser. 2, v. 84, Oct. 15, 1951, p. 367-368.

The melting of Ge shows a certain analogy to the transition from gray, semiconducting tin to white metallic tin at 13° C. (P15, Ge)

366-P. Ferromagnetism in Heusler's Alloys. Robert R. Heikes. *Physical Review,* ser. 2, v. 84, Oct. 15, 1951, p. 376-377.

Ferromagnetism of the Heusler alloys is usually attributed to the positive exchange interaction of the Mn atoms (Heisenberg's theory). However, the magnetic properties of these alloys can also be explained by Zener's theory of ferromagnetism. Using known data, some semi-quantitative calculations are made for Cu_2MnIn and Cu_2MnAl. (P16, Cu, Mn, In, Al)

367-P. Thermal Conductivity of Superconducting Lead in the Intermediate State. R. T. Webber and D. A. Spohr. *Physical Review,* ser. 2, v. 84, Oct. 15, 1951, p. 384-385.

Data for high-purity Pb are charted and discussed. (P11, Pb)

368-P. Magnetic Phenomenon. Alvin B. Kaufman. *Radio-Electronics,* v. 23, Nov. 1951, p. 41-43.

An unusual phenomenon is the change of resistance of bismuth wire when placed in magnetic fields of different intensities. This change of resistance is as high as 100 to 1. Other electrical and magnetic properties. Present and potential electronics applications. Diagrams and illustrations of equipment for study of these properties. (P17, Bi)

369-P. The Vapor Pressures of Lanthanum and Praseodymium. Adrian Hill Daane. U. S. Atomic Energy Commission, AECD-3209, Dec. 14, 1950, 92 pages.

A technique for preparing rare-earth metals was devised in which their chlorides were reduced by Ca in Ta vessels; the resulting metal was cast in Ta molds to remove volatile impurities. A technique for measuring vapor pressures of materials of low volatility consisted of modifying Knudsen's effusion method by placing a quartz fiber balance inside of the vacuum apparatus to measure weight losses from the effusion vessel. 106 ref. (P12, La, Pr)

370-P. The Variation of the Resistivity of Some Metals With Elastic Deformation. (In English.) M. J. Druybesteyn. *Physica,* v. 17, Aug. 1951, p. 748-760.

Measured on wires and foils. In case of Al, single crystals were prepared and all three crystal constants of the tensor, giving the relation between relative variation of resistivity and deformation, could be determined. In the case of Cu, Ag, and Au, foils with a preferred orientation were used. From the measurements on these foils, anisotropy could not be determined; hence it was not possible to calculate exactly their constants. Product of anisotropy and degree of texture of the foil was determined. (P15, Q21)

371-P. A Possible Explanation of the Increase of the Electrical Resistance of Thin Metal Films at Low Temperatures and Small Field Strengths. (In English.) C. J. Gorter. *Physica,* v. 17, Aug. 1951, p. 777-780.

The film is supposed to consist of separate grains or blocks and the energy required for separation of a positive and a negative charge, located on different grains, is compared with the thermal energy. (P15)

372-P. Structure and Thermomagnetic Properties of Cobalt Carbide, Co_2C. (In French.) J. Drain and A. Michel. *Bulletin de la Société Chimique de France,* July-Aug. 1951, p. 517-519.

By exposing Co to CO_2 at 210° C., Co_2C was obtained. It is assumed that this results from insertion of C atoms into the orthorhombic lattice of the Co, which produces various solid solutions, of which CoC is the upper limit. The thermal evolution of Co_2C was investigated. (P16, P12, Co, C-n)

373-P. The Solubility of Carbon in Iron. (In French.) Marcel Guédras. *Métallurgie et la Construction mécanique,* v. 83, Sept. 1951, p. 653-654.

Solubility for various temperatures, on the basis of existing information. (P12, Fe)

374-P. Influence of Phosphorus on the Activity of Sulfur in Liquid Iron. (In French.) John Chipman and Charles W. Sherman. *Revue de Metallurgie,* v. 48, Aug. 1951, p. 613-618; disc., p. 618.

Discussed as a problem of a non-metallic solute in a metallic solvent. Experimental methods and results; activity in ternary and quaternary systems. 11 ref. (P12, Fe)

375-P. Observations on Molten Contact Bridges. III. (In German.) Gerhard Schrag and Rudolf Toberer. *Zeitschrift für Metallkunde,* v. 42, Aug. 1951, p. 243-245.

Tendency of Cu, Ni, and Co to form stationary oxide-containing molten "bridges" with Au at electrical contacts. A very small amount of gold was found to reduce greatly the formation of these bridges. (P15, Cu, Ni, Co)

376-P. Research on the Wetting Effect and on Liquostriction. (In Italian.) Carl Benedicks and Robert Härden. *Metallurgia Italiana,* v. 43, Sept. 1951, p. 383-397.

Previous work proved that resistance to tensile stress of solids is affected by positive or negative "wetting action" of various liquids in contact with the surfaces. Results of further work show that the wetting effect is a function of surface tension of the wetting agent and that tensile strength decreases with increasing hardness of the solid. Theoretical interpretation of these observations. Demonstrates existence of the "liquostriction" phenomenon—expansion of solids caused by contact with liquids. Results obtained with various ferrous and nonferrous metals and alloys are tabulated and charted. 13 ref. (P10, Q23)

377-P. The Surface Tension of Mercury, Melted Tin, Bismuth, Lead, and Some Lead Alloys. (In Polish.) J. Foryst. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 4, 1951, p. 307-327.

Determined by the maximum-bubble-pressure method. Surface tension of mercury, measured against H_2, N_2, and CO_2, depends on time of contact with these gases. Surface tension of molten Sn and Pb is higher against Co_2 than against N_2 and H_2. The complex association of metals cannot be determined by calculating the Eötvös constant on basis of experimental data. Small additions of Zn and Sn do not affect the surface tension of molten Pb. 32 ref. (P10, Hg, Sn, Pb, Bi)

378-P. Investigation of the Magnetic Properties of Ordered Alloys of the Co-Mn System. (In Russian.) F. Galperin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Apr. 21, 1951, p. 1011-1014.

Shows a linear dependence of paramagnetic susceptibility on degree of order and a dependence of mass susceptibility on holding time and temperature, for Co-Mn alloys. Experimental data thus indicate that the variation of magnetic properties of these alloys is induced by the order-disorder transformation. (P16, Co, Mn)

379-P. Physical, Thermal and Electrical Properties of Hafnium and High-Purity Zirconium. H. K. Adenstedt. *American Society for Metals,* Preprint 1W, 1951, 19 pages.

Properties of 99+% Hf and 99.9+% Zr that were determined are melting point, modulus of elasticity, thermo-electric force relative to platinum between room temperature and approximately 1830° F., electrical resistivity and thermal expansion between −294 and approximately 1830° F., and mean specific heat between 80 and 212° F. Samples were prepared from as-deposited iodide crystal bars, cold swaged rods, cold swaged and annealed rods, annealed sheet, and wire. 26 ref. (P12, P11, P15, Q21, Hf, Zr)

380-P. The Solubility of Carbon in Molten Iron and in Iron-Silicon and Iron-Manganese Alloys. John Chipman, Robert M. Alfred, Lester W. Gott, Richard B. Small, Duncan M. Wilson, C. Napier Thomson, Donald L. Guernsey, and James C. Fulton. *American Society for Metals,* Preprint 4W, 1951, 16 pages.

A simple experimental method in

which molten metal in equilibrium with a graphite container is quenched in a water-cooled Cu mold. Data on the solubility of C in Fe may be expressed as a linear function of temperature between the eutectic and about 2000° C. At higher temperatures, irregularly higher solubilities were observed. The solubility is increased by Mn and diminished by Si. At 21-23% Si, a second solid phase appears. Data are presented for the range 1290-1690° C. for alloys containing up to 20% Si or 70% Mn. 16 ref. (P12, Si, Mn, Fe)

381-P. High-Temperature Reactions in the System Titanium Carbide-Boron Carbide. Harold M. Greenhouse, Oliver E. Accountius, and Harry H. Sisler. *Journal of the American Chemical Society*, v. 73, Nov. 1951, p. 5086-5087.

TiC and B_4C are shown, above 1920° C., to produce TiB_2, carbon, and a higher boride of Ti of unknown composition. (P13, C-n, Ti, B, SG-h)

382-P. The Gaseous Species of the Al-Al_2O_3 System. Leo Brewer and Alan W. Searcy. *Journal of the American Chemical Society*, v. 73, Nov. 1951, p. 5308-5314.

Vapor pressures of Al and of Al_2O_3 were both measured by the Knudsen effusion method. Results of these determinations and results from heating of Al-Al_2O_3 mixtures were used in deciding the identity of the important gaseous species of the system. Al_2O gas is evolved when Al_2O_3 is heated with Al or another reducing metal. AlO appears to be the principal Al species when Al_2O_3 is volatilized alone. Thermodynamic constants were determined. 21 ref. (P12, Al)

383-P. (Book) Metallurgical Thermochemistry. O. Kubaschewski and E. Ll. Evans. Butterworth-Springer, Ltd., Bell Yard, Temple Bar, London W.C.2, England. 35s.

A comprehensive review of metallurgical thermodynamics. The first three sections deal with thermodynamics, experimental methods employed in thermochemistry, and estimation of thermochemical data when direct experimental determinations are not available. Fourth section: 100 pages of tables giving detailed thermochemical and thermodynamical data for a large number of elements and compounds, metallic solutions, and metallurgical reactions, with estimated accuracy of all tabulated values of heat capacities and free energies of reaction. Fifth section: Some examples of thermodynamical treatment of metallurgical problems. (P12)

Q

MECHANICAL PROPERTIES AND TEST METHODS; DEFORMATION

716-Q. The Strength Characteristics of Helical Springs. R. C. A. Thurston. *Canadian Mining and Metallurgical Bulletin*, v. 44, Oct. 1951, p. 658-667; disc., p. 667-668. *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 54, 1951, p. 414-423; disc., p. 423-424.

Numerous considerations affecting the design of helical compression springs. Brief mention of modern methods of spring manufacture, particularly as regards their effect on strength characteristics. A critical analysis of stresses in such springs, and results of laboratory tests under static loading on a series of truck bolster springs. Effects of the various methods developed for increasing life or endurance of compression springs, such as shot-peening and scragging. 14 ref. (Q23, G23, T7, ST)

717-Q. Three-Faceted Diamond Pyramid for Micro-Hardness Testing. E. S. Berkovich. *Industrial Diamond Review*, v. 11, June 1951, p. 129-132. (Translated from *Zavodskaya Laboratoriya* (Factory Laboratory), v. 16, no. 3, 1950, p. 345-347.)

Additional information concerning Russian work. Test data obtained on various metallic and nonmetallic materials are tabulated and charted. (Q29)

718-Q. Allowable Compressive Stresses in Aircraft Structures. B. E. Gatewood and E. L. Williams. *Journal of the Aeronautical Sciences*, v. 18, Oct. 1951, p. 657-664.

Procedures for determining allowable buckling and maximum compressive stresses in both the elastic and plastic regions for structural materials for which compressive stress-strain curves are known. Curves are shown for Al and Mg alloys. Detailed procedures for obtaining allowable compressive stresses in both the elastic and plastic regions for various types of aircraft structure under compressive loads. 51 ref. (Q28, Al, Mg)

719-Q. The Role of Tetragonal Twins in the Internal Friction of Copper Manganese Alloys. Arthur V. Siefert and Francis T. Worrell. *Journal of Applied Physics*, v. 22, Oct. 1951, p. 1257-1259.

Internal-friction studies were made of an 88% Mn, 12% Cu alloy. This alloy when annealed at 925° C. and quenched to room temperature has a tetragonal structure of axial ratio 0.97. Twins are readily formed along the (101) and (011) planes. It is verified that relaxation across these twin boundaries would account for certain observed internal friction. (Q22, M26, Mn)

720-Q. The Yielding Behavior of Iron Single Crystals. A. N. Holden. *Journal of Applied Physics*, v. 22, Oct. 1951, p. 1290-1291.

In three recent experiments small amounts of carbon or nitrogen were deliberately added to otherwise pure single crystals of iron, and effect on yielding studied. In one experiment no initial yield point was observed while, in the others, initial yield points of small magnitude were observed. Hence, further experimental work was done. Results are summarized and explained theoretically. (Q23, Fe)

721-Q. Fracture and Yield Stress of 1020 Steel at Low Temperatures. A. S. Eldin and S. C. Collins. *Journal of Applied Physics*, v. 22, Oct. 1951, p. 1296-1297.

Several samples were tested at various temperatures in the interval 12-61.5° K. All exhibited typically brittle fracture with no reduction in area. At 75° K., however, a definite yield point was observed and increase in length before rupture was unexpectedly large. Results indicated a sharp transition near 61.5° K., below which no reduction of area occurs and above which the reduction of area increases rapidly with temperature. (Q27, CN)

722-Q. Inhomogeneities in the Plastic Deformation of Metal Crystals. I. Occurrence of X-Ray Asterisms. II. X-Ray and Optical Micrography of Aluminium. R. W. K. Honeycombe. *Journal of the Institute of Metals*, v. 80, Oct. 1951, p. 45-56.

Occurrence of X-ray asterisms from deformed single crystals of a typical hexagonal metal (Cd) and a typical cubic metal (Al). The experiments suggest that tensile deformation causes Al, but not Cd, crystals to break down into a series of slightly disoriented blocks connected by regions of distortion or lattice curvature. Part II: technique of X-ray microscopy used in conjunction with optical micrography to investigate structure of large Al crystals deformed by small amounts in tension. Effects of crystal orientation, temperature and speed of deformation, and purity of metal on occurrence of kink bands. 37 ref. (Q24, M21, Al, Cd)

723-Q. Micro-Slip in Metal Crystals. A. F. Brown and R. W. K. Honeycombe. *Philosophical Magazine*, ser. 7, v. 42, Oct. 1951, p. 1146-1149.

Al crystals, the surfaces of which were prepared for examination by electropolishing, show extremely fine slip bands (displacements of 150 A. or less) after small plastic deformations of about 0.5-2%. The more familiar coarse bands involving displacements of the order of 5000 A. appear subsequently. However, if the metal surface is mechanically polished prior to electrolytic polishing, the coarse bands occur in the earliest stages of deformation. Two possibilities are: first, that the micro-slip is a phenomenon restricted to the vicinity of the surface and is highly dependent on the nature of it; second, that the fine slip may be typical of initial slip processes within the metal, but is almost entirely suppressed as the deformation proceeds. (Q24, L13, Al)

724-Q. Metallic Transfer Between Sliding Metals: An Autoradiographic Study. E. Rabinowicz and D. Tabor. *Proceedings of the Royal Society*, ser. A, v. 208, Sept. 24, 1951, p. 455-475.

A study of friction and metallic transfer between sliding metal surfaces in the absence and in the presence of boundary lubricant films. Six metal pairs were studied. One surface is made radioactive and is slid over the surface of a second, non-radioactive metal, the amount of metal transferred being detected by blackening of a photographic plate in contact with the second surface. The results indicate that friction between metals is due largely to formation and shearing of metallic junctions, and that the main function of a boundary lubricant is to reduce the amount of metallic interaction. 32 ref. (Q9)

725-Q. Tests for SAE Grade 5 Bolts. *SAE Journal*, v. 59, Oct. 1951, p. 57-61.

Data on Rockwell hardness, tensile strength, yield strength, and elongation are graphed and tabulated. The bolts contained 0.42% C, 0.82% Mn, and 2.25% Si. (Q27, Q29, T7, ST)

726-Q. Internal Friction of Solids. R. M. Davies. "Some Recent Developments in Rheology", United Trade Press (London), 1950, p. 27-37.

Internal friction in vibrating solids. Methods of measurement. Causes and mechanism of the phenomenon. 32 ref. (Q22)

727-Q. Application of the Pendulum to the Measuring of Surface Hardness. "Pendulum Hardness"—Microhardness of Chromium Deposits. (In French.) Le Rolland. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1950-51, p. 7-15.

Experiments with a relatively new hardness measuring apparatus. The results agree with those obtained by other methods. Various devices and their mode of operation. (Q29, L17, Cr)

728-Q. Contribution to the Study of Hardness of Hard Chromium Deposits, Produced in Industry and in the Laboratory. (In French.) A. Mittenne. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1950-51, p. 32-46.

Influence of the hardness of the base metal on hardness measurements on Cr deposits. Methods and results. (Q29, L17, Cr, ST)

729-Q. Mechanism of Fracture of Pearlite. (In Czech.) Vladimir Zednik and Zdenek Kaderavek. *Hutnické Listy*, v. 6, May 1951, p. 211-220.

Fracture mechanism in pearlite subjected to shock strains was studied fractographically on notched samples of eutectoid carbon steel in the range −195 +150° C. In the first stage of the fracture, cracks appear selectively on the boundaries of ferrite and cementite plates in a number of grains with a favorable orientation of lamellar to normal stress. It appears, therefore, that for inception of fracture, cohesion of pearlite components is the deciding factor. In the second stage of fracture, interlamellar fusion of microcracks and concentration of stress resulting in translamellar fracture in neighboring grains occurs. Includes numerous fractographs. (Q26, ST)

730-Q. Thermodynamics of Plastic Deformation. (In Russian.) N. S. Fastov. *Doklady Akademii Nauk SSSR*, (Reports of the Academy of Sciences of the USSR), new ser., v. 78, May 11, 1951, p. 251-254.

Derives an expression for free energy of a body undergoing plastic deformation with given end velocity. Expressions are developed for the relation between yield point, maximum elastic deformation, and rate of deformation; and between stress and deformation and its rate during plastic deformation, and the shape of the creep curve; all agreeing qualitatively with experimental data. (Q24, P12)

731-Q. Fatigue of Metals. (In Russian.) N. S. Akulov, I. P. Mazin, and Ya. I. Feldshtein. *Doklady Akademii Nauk SSSR*, (Reports of the Academy of Sciences of the USSR), new ser., v. 78, May 11, 1951, p. 263-266.

On the basis of a simple physical model of the formation of primary fatigue cracks, a relation was established between amplitude of vibrating stress and number of cycles. This relation is in good agreement with experimental data of various authors. (Q9)

732-Q. Impact Properties of Stainless Steel and 9 Per Cent Nickel Steel After Exposure Under Stress to Liquid Nitrogen. T. N. Armstrong and A. J. Miller. *ASTM Bulletin*, Oct. 1951, p. 35-36.

Data are tabulated. (Q6, SS)

733-Q. Reproducibility of Bend Test for High Hardness Steels. L. D. Jaffe and D. C. Buffum. *ASTM Bulletin*, Oct. 1951, p. 36-37.

High-carbon, alloy-steel specimens were given a single heat treatment that produced a Rockwell hardness of C-52½. The strength of these specimens was determined by bending under two-point loading until rupture occurred. (Q5, AY)

734-Q. Effect of Amplitude of Dynamic Stress on High Temperature Fatigue Life. John E. Breen. *ASTM Bulletin*, Oct. 1951, p. 38-39.

A study of the effect of dynamic amplitude on α-brass (70% Cu, 30% Zn) at high temperatures. In these tests, dynamic stress was varied from zero to as close to 100% as practicable, while static stress was held constant. (Q7, Cu)

735-Q. Apparatus for Low-Temperature Tension Tests of Metals. Robert J. Mosborg. *ASTM Bulletin*, Oct. 1951, p. 41-44.

Apparatus developed in the Structural Research Laboratory of the Civil Engineering Dept. at the University of Illinois. In the range between room temperature and the temperature obtainable with solid CO_2, no special difficulties were encountered, and relatively simple apparatus and procedures can be used. (Q27)

736-Q. Hot-Workability of Stainless Steel Improved by Adding Cerium and Lanthanum. C. B. Post, D. G. Schoffstall, and H. O. Beaver. *Journal of Metals*, v. 3, Nov. 1951, p. 973B-977B.

In experimental work conducted by Carpenter Steel Co., it was found that rare earths are effective in improving the hot workability of austenitic, or partly austenitic grades of stainless steels containing 4-70% Ni, and 10-60% of elements from the group of Cr, Mo, and W, the amount of any one not to exceed 30%. Photographs of forged-cone specimens, rolled billets, strips, slabs, etc. (Q23, SS)

737-Q. Solid Solution Alloys of Magnesium With Lithium and Indium. W. R. Hibbard, Jr., A. L. Kearney, W. H. Hawley, Jr., and E. C. Burke. *Journal of Metals*, v. 3, Nov. 1951, p. 978-979.

Comparative plasticity, strain hardening, microstructure, and preferred orientation.
(Q23, Q24, M27, Mg, Li, In)

738-Q. Work Hardening-Reannealing Cycle of Pure Silver. Marian Balicki and Goldye Leeds. *Journal of Metals*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 981-986.

Effects of cold work and annealing of various types on elongation, ultimate stress, thermoelectric power of couples (annealed vs. cold-worked Ag), activation energies, frequency coefficients, etc. Results are shown on 2- and 3-dimensional graphs, in which comparison between experimental and calculated values is made. 14 ref.
(Q general, P general, J23, Ag)

739-Q. Effect of Rare-Earth Metals on the Properties of Extruded Magnesium. T. E. Leontis. *Journal of Metals*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 987-993.

The specific effect of various rare-earth metals on the room and elevated-temperature properties of Mg was evaluated. Alloys containing didymium exhibit the highest tensile and compressive strengths at room and elevated temperatures. All the rare-earth metals increase the creep resistance of extruded Mg at temperatures of 400-600° F., but degree of enhancement depends on temperature and on concentration of the added metal.
(Q27, Q28, Q3, Mg)

740-Q. Torsion Texture of Copper. *Journal of Metals*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 1062-1064.

Discussion of above paper (by W. A. Backofen). (Dec. 1950 issue. See item 857-Q, 1950.) (Q1, Q24, Cu)

741-Q. Effect of Alloying Elements on True-Stress True-Strain Flow Curves of Pearlitic Steel. *Journal of Metals*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 1065-1066.

Discussion of above paper (R. Raring, J. A. Rinebolt, and W. J. Harris, Jr.). (May 1951 issue, see item 276-Q, 1951.) (Q23, AY)

742-Q. Effect of Ferrite Grain Structure Upon Impact Properties of 0.80 Pct. Carbon Spheroidite. *Journal of Metals*, v. 3, Nov. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 1064-1065.

Discussion of above paper (by M. Baeyertz, W. F. Craig, Jr., and E. S. Bumps). (Dec. 1950 issue, see item 858-Q, 1950.) (Q6, M27, ST)

743-Q. Fundamental Effects of Cold-Working On Creep Properties of Low-Carbon N-155 Alloys. D. N. Frey, J. W. Freeman, and A. E. White. *National Advisory Committee for Aeronautics*, Technical Note 2472, Oct. 1951, 45 pages.

See abstract of "Fundamental Effects of Cold Working on the Creep Resistance of an Austenitic Alloy," D. N. Frey and J. W. Freeman, *Journal of Metals*, item 617-Q, 1951.
(Q3, SS)

744-Q. Experimental Diagrams of Deformation and Strain Distribution in Curved Plates Under Compression. K. B. Jackson and A. H. Hall. *National Research Council of Canada*, Aeronautical Report AR9, 1951, 149 pages.

Data in the form of stress-strain curves for 19 representative plates covering a range of width-to-thickness ratio from 77 to 400, and ratios of plate thickness to radius of curvature from 0 to 1.6×10^{-3}. Specimens were BSS-5L3 and AC17-ST sheet. (Q28, ST)

745-Q. Titanium and Zirconium—Emergency Substitutes for Manganese. William W. Austin, Jr. *Steel*, v. 129, Nov. 5, 1951, p. 110, 112, 115.

Investigations on Ti and Zr as replacements for Mn in steels indicate that these elements not only show good promise as substitutes but also impart some distinctly beneficial properties to fully killed steels. The hot bend impact test was used in the investigation for determining hot short temperature ranges in steels.
(Q23, Q6, ST, Ti, Zr)

746-Q. The Influence of Homogenizing Heat Treatment on Creep Resistance. (In French.) Georges Delbart and Michel Ravery. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 233, Sept. 17, 1951, p. 651-653.

Study on a steel containing 0.12% C, 0.6% Cr, and 0.6% Mo. Treatment was for 300 hr. at 700° C. after different preliminary heat treatments. The degree to which homogenization treatment diminished the creep resistance of steel is interpreted. (Q3, J21, AY)

747-Q. Mechanical Deformation of Metals. (In French.) C. Chaussin. *Métallurgie et la Construction mécanique*, v. 83, Sept. 1951, p. 665, 667, 669, 671.

General consideration of plasticity of monocrystals, deformation by translation, dynamics of translation, and the plasticity of polycrystals. Schematic diagrams. (Q24)

748-Q. Experimental Study of the Plastic Deformation of Metallic Crystals. (In French.) C. Crussard. *Métaux: Corrosion — Industries*, v. 26, July-Aug. 1951, p. 279-291.

Descriptive review of the literature. Various aspects, such as plastic slip of monocrystals, kinking, and creep. 36 ref. (Q24, Q3)

749-Q. Theoretical Study of the Plasticity of Crystals. (In French.) Pierre Laurent. *Métaux: Corrosion—Industries*, v. 26, July-Aug. 1951, p. 292-305.

A review on the basis of the literature. Geometry of dislocations, stress around a dislocation, mobility and origin of dislocations, and formation of dislocations in 2- and 3-dimensional crystals. 21 ref.
(Q24, M26)

750-Q. Various Methods for Perfection of Alloys Having Good Mechanical Properties at High Temperatures. (In French.) A. Guessier. *Métaux: Corrosion — Industries*, v. 26, July-Aug. 1951, p. 310-317.

Procedures and apparatus used for stainless steels, in addition to classical methods, which make possible extensive testing with a minimum expenditure of time and effort. Advantages of these auxiliary methods. 14 ref. (Q general, SG-h)

751-Q. The Extraordinary Characteristics of Pure, Sintered Aluminum.

(In French.) Maurice Victor. *Revue de l'Aluminium*, v. 28, July-Aug. 1951, p. 267-268.

Products made of this material possess improved mechanical properties at room temperature and great resistance to heat. The role of the oxide layer and method for preparation of powdered metal. Results are compared with those obtained from A-U4G, A-SG, and A-UN alloys. (Q general, H10, Al)

752-Q. Reversion of Temper Brittleness. (In French.) L. D. Jaffe and D. C. Buffum. *Revue de Métallurgie*, v. 48, Aug. 1951, p. 609-612; disc., p. 612.

Results of experiments on above phenomenon in SAE 3140 steel. "Reversion" is defined as a break or temporary reversal in the curve of variation of a property with increase in temperature. Certain general rules for the process are indicated. (Q23, AY)

753-Q. Evaluation of Stampability of a Steel From True Stress-Strain Curves and From Data of the K. W. I. Test. (In French.) P. Bastien and C. Winter. *Revue de Métallurgie*, v. 48, Sept. 1951, p. 641-657; disc., p. 658.

Experiments were made on very mild steel containing 0.07% C., 0.035% Mn, 0.030% Si; 0.030% S, and 0.025% P, cold rolled to 0.5-2.9 mm. thickness. Results of various tests. Other tests were done on extra mild steel of various compositions. "K. W. I." tests are described in detail. (Q23, G3, CN)

754-Q. Comparison Among the Influences of Titanium, Columbium, and Tantalum Additions on the Properties of Steel. (In French.) A. Kohn. *Revue de Métallurgie*, v. 48, Sept. 1951, p. 687-711.

The literature is comprehensively reviewed and correlated. Examination of binary and ternary phase diagrams Fe-Cb, Fe-Ta, Fe-Ti, Fe-Cb-C, Fe-Ta-C, and Fe-Ti-C; effects of Cb, Ti, and Ta on properties of Fe and Fe-C alloys; and influence of additions of Ti, Cb, and Ta on properties of different types of stainless and alloy steels. Various mechanical properties and corrosion resistance were determined. 60 ref. (Q general, R general, M24, AY, SS)

755-Q. Investigation of Fatigue Testing Machines by Means of Elongation-Measuring Strips. (In German.) Kurt Fink and Max Hempel. *Archiv für das Eisenhüttenwesen*, v. 22, July-Aug. 1951, p. 265-273, disc., p. 273.

Procedure for checking accuracy of different fatigue-testing machines. (Q7)

756-Q. Mechanical Testing of Gas-Welded Rails. (In German.) H. Kunz and W. Raabe. *Schweissen und Schneiden*, v. 3, Sept. 1951, p. 269-272.

Experimental results show that heat treating welded rails increases their fatigue strength to about 90% of that of unwelded rails and that even the non-heat treated welds are strong enough to meet all requirements. (Q7, K2, CN)

757-Q. Research on the Ductility of Cold Heading Steels. (In German.) Joseph Bfligmann. *Stahl und Eisen*, v. 71, Aug. 2, 1951, p. 826-836; disc., p. 836-839.

Tests were made on 13 unalloyed and low-alloy steels that were subjected to different heat treatments and then cold drawn to reduce their cross sections by 0-30%. Plasticity of the steels was found to depend greatly on heat treatment; cold drawing was found to reduce cold workability. 30 ref. (Q23, CN, AY)

758-Q. Recrystallization Textures of Copper Wires. (In German.) Hans Joachim Walbaum. *Zeitschrift für Metallkunde*, v. 42, July 1951, p. 207-210.

Results of experiments. Includes X-ray pictures, micrographs, and graphs. 10 ref. (Q24, Cu)

759-Q. Composite Cables for Open-Air Transmission Lines. (In German.) Karl Kohler. *Zeitschrift für Metallkunde*, v. 42, July 1951, p. 213-216.

Discussion of mechanical properties includes nomograms for determination of conductivity and modulus of elasticity of different sizes of steel-aluminum cables.
(Q general, P15, T1, ST, Al)

760-Q. The Influence of Size on Yield Point and Bending Fatigue Resistance. (In German.) Alfred Schaal. *Zeitschrift für Metallkunde*, v. 42, Sept. 1951, p. 279-284.

Tensile and bending tests made on low-alloy Cr-Mn steel, carbon steel, and on Al alloys of different size and cross section to determine effect of size and heat treatment. 18 ref. (Q27, Q5, CN, AY, Al)

761-Q. Wire Resistance Strain Gages for Measurement of Stresses. (In Polish.) W. Tomaszczyk. *Prace Glownego Instytutu Metalurgii*, v. 3, no. 4, 1951, p. 329-349.

Development, theory, production, and applications. Effects of humidity and methods of waterproofing. Includes circuit diagrams. 30 ref. (Q25)

762-Q. Temper Embrittlement in Plain Carbon Steels. Joseph F. Libsch, Arthur E. Powers, and Gopalkrishna Bhat. *American Society for Metals*, Preprint 8W, 1951, 11 pages.

Development of embrittlement in a commercial AISI-1050 steel tempered above 850° F. after hardening. Influence of time and temperature upon the progress of embrittlement is indicated by isoembrittlement curves. It is concluded that plain-carbon steels are highly susceptible to temper embrittlement above 850° F. Degree of embrittlement increases with time and temperature. The new data provide a fundamental basis for re-evaluation of the influence of alloying elements on temper embrittlement, and for reconsideration of its mechanism. 13 ref. (Q23, J29, CN)

763-Q. The Fatigue Properties of Some Binary Alpha Solid Solutions of Aluminum. J. W. Riches, O. D. Sherby, and J. E. Dorn. *American Society for Metals*, Preprint 10W, 1951, 14 pages.

Alloying additions invariably increase the fatigue strength of alpha solid solutions of aluminum; the order of increasing effectiveness per atomic per cent of the added element is: Zn, Ag, Cd, Mg, Ge, and Cu. This is an agreement with the order of increasing effectiveness of alloying elements in improving the plastic properties of alpha solid solutions of Al. (Q7, Al)

764-Q. Overcoming Rheotropic Brittleness: Precompression Versus Pretension. E. J. Ripling and W. M. Baldwin, Jr. *American Society for Metals*, Preprint 11W, 1951, 8 pages.

Brittle behavior at low temperatures, high strain rates, and under severe notched conditions of metals not crystallizing in the face-centered cubic system has previously been shown to be largely strain curable; that is, rheotropic. Prestraining and testing were both tensile strains in the same direction. Shows that subtransition-temperature tensile ductility is also improved by supertransition compressive prestrains in the same direction as the subsecuent tensile strain. A difference in the temperature dependence of precompressed steel and Al is also pointed out. (Q23)

765-Q. The Functions of Alloying Elements in the Creep Resistance of Alpha Solid Solutions of Aluminum. A. T. Robinson, T. E. Tietz, and J. E. Dorn. *American Society for Metals*, Preprint 12W, 1951, 33 pages.

Creep data at 422° K. revealed that the creep resistance of a series of high-purity binary alpha solid solutions in aluminum decreased in the order Al-Mg, Al-Cu, Al-Ag, Al-Ge, and Al-Zn. The highest creep resistant alloys Al-Mg and Al-Cu were those which exhibited the highest solid-solution strengthening in tension, the greatest Cottrell Effect, and the highest resistance to recovery. 11 ref. (Q3, Al)

766-Q. Influence of Grain Size on Work Hardening and Fatigue Characteristics of Alpha Brass. G. M. Sinclair and W. J. Craig. *American Society for Metals*, Preprint 14W, 1951, 18 pages.

The relationship between metallurgical grain size and strength properties of 70-30 cartridge brass is discussed from the viewpoint of the "fragmentation" theory of work hardening. Results of hardness, tensile, and fatigue tests performed on the brass appear to be consistent with the concepts of this simple hypothesis. 20 ref.
(Q27, Q29, Q7, M27, Cu)

767-Q. The Embrittlement of Pure Iron in Wet and Dry Hydrogen. James K. Stanley. *American Society for Metals*, Preprint 15W, 1951, 10 pages.

Observation of anomalous impact data on pure Fe led to an investigation of ductility and brittleness occurring in this material when hydrogen-annealed. Simple bend test was devised to determine the extent of brittleness developed in a strip about 0.1 in. thick. Conditions for brittleness in wet and dry hydrogen were established. (Q23, Q5, Fe)

768-Q. A Theory of Rockwell Ball Hardness. M. A. Du Toit Meyer. *Applied Scientific Research*, v. A3, p. 11-26.

A general expression for Rockwell ball-hardness numbers in terms of the Meyer constants n and b is given. Theoretical results are in agreement with experimental results. Conversion of Meyer and Brinell hardness numbers to Rockwell hardness numbers. 11 ref. (Q29)

769-Q. Working Stresses for Helical Springs. O. G. Meyers. *Machine Design*, v. 23, Nov. 1951, p. 135-138, 190.

Maximum allowable design stress is not constant for a given spring material but varies with wire diameter, stress range, and required number of operating cycles. Three types of fatigue-testing equipment especially designed for spring testing. Typical test results and their interpretation. (Q7, Q25)

770-Q. A High-Strength Die Steel That Can Be Cold-Hobbed. G. E. Brumbach. *Machinery* (American), v. 58, Nov. 1951, p. 154-159.

New steel, known by the trade name Super Samson, contains 0.10% C, 0.30% Mn, 0.25% Si, 5.00% Cr, 0.90% Mo, and 0.25% V. This alloy can be annealed to a hardness of about Brinell 125—relatively easy to hob—and can be hardened by cooling in air or oil. High hardnesses are quite stable up to and including 1000° F., and the high alloy content produces good resistance to abrasion. This combination of properties is said to be ideal for cavities used in die casting Zn, Al, and Mg, as well as molds for plastics as requiring temperatures up to 800° F. Typical products. (Q29, Q9, T5, AY)

771-Q. Rupture Properties of Low-Carbon N-155 Type Alloys Made With a Columbium-Tantalum Ferro-Alloy. J. W. Freeman, E. E. Reynolds, and A. E. White. *National Advisory Committee for Aeronautics*, Technical Note 2469, Oct. 1951, 11 pages.

Metallographic examinations were made in as-cast, hot-forged, solution-treated, aged, and rupture-tested conditions. Composition was 20 Cr, 20 Ni, 20 Co, 2 Cb. Vickers hardness tests were made on bar stock in the solution-treated and the aged conditions.
(Q26, Q29, SG-b, Fe-n, Cb)

772-Q. Recent Tests on Concrete Beams Reinforced With Chromium Steel; Summarized From Reports of the EMPA. (In German.) *Von Roll Mitteilungen*, v. 10, Mar. 1951, p. 1-11.

Comparison with beams reinforced with ordinary structural steel is made. (Q23, T26, CN, AY)

773-Q. Investigation of the Resistance to Deformation of Metals and Alloys. (In Swedish.) Gunnar Wallquist. *Jernkontorets Annaler*, v. 135, no. 6, 1951, p. 197-218.

Preliminary investigations made to develop simple methods for determining the resistance to deformation of metals and alloys on application of static load or impact. Thirty-nine different materials —7 carbon steels, 25 alloy steels, Al, Cu, brass and 4 Al alloys—were tested at different temperatures. (Q24)

R

CORROSION

428-R. An Investigation of the Corrosion of Domestic Hot Water Tanks. P. J. Sereda, W. R. Thomas, and M. Cohen. *Canadian Journal of Technology*, v. 29, Oct. 1951, p. 435-446.

Results based on physical and metallographic examination of tanks taken from 15 localities in Ontario. Evidence shows that polarity of the Zn-Fe couple reverses under certain service conditions. 14 ref. (R4, Zn, ST)

429-R. Corrosion of Copper Powder; Recent Russian Research. *Chemical Age*, v. 65, Oct. 6, 1951, p. 471-473.

Reviews recent work of Pomosov and co-workers, also other Russian investigators. (R general, Cu)

430-R. Materials of Construction vs. Hydrogen Peroxide. *Chemical Engineering*, v. 58, Oct. 1951, p. 263-264, 266-268, 270-271.

Revision of article by J. S. Reichert and R. H. Pete, which appeared originally in the Apr. 1947 issue. Followed by short articles by other authors: "Nickel & Nickel Alloys," W. Z. Friend; "High-Silicon Irons," Walter A. Luce; "Glass Lining," S. W. McCann; "Worthite," W. E. Pratt; "Silicones," J. A. McHard and Leon Van Volkinburg; "Chlorimets," Walter A. Luce; "Carbon & Graphite," W. M. Gaylord; "Cements," Raymond B. Seymour; and "Durimet 20," Walter A. Luce. (R6)

431-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 43, Oct. 1951, p. 107A-108A, 110A.

Third of a series summarizing corrosion data in chart form presents concentrations and temperatures for Durimet 20 by H_2SO_4. (R5, SS)

432-R. Corrosion Experiments with Gaseous Boron Trifluoride. F. Hudswell, J. S. Nairn and K. L. Wilkinson. *Journal of Applied Chemistry*, v. 1, Aug. 1951, p. 333-336.

A number of constructional materials—metals, alloys and miscellaneous compounds—which may be required to come into contact with BF_3—were subjected to treatment with this gas under carefully controlled conditions. Many of the materials examined showed a high resistance to chemical attack. The following metals can be safely used in apparatus for handling dry BF_3: stainless steel, mild steel, copper, nickel, monel metal, brass, and aluminum, and the more noble metals up to at least 200° C. (R9)

433-R. The Corrosion of a Steel Surface by Condensed Films of Sulphuric Acid. D. Flint and R. W. Kear. *Journal of Applied Chemistry*, v. 1, Sept. 1951, p. 388-393.

Experimental technique. Rate of corrosion increases with increasing H_2SO_4 dew-point; and irrespective of dew-point temperature, rate of corrosion reaches a maximum at a surface temperature of the steel between 20 and 45° C. below that of the dew-point. 12 ref. (R5, ST)

434-R. The Influence of Carbon Smokes on the Corrosion of Metal Surfaces Exposed to Flue Gases Containing Sulphur Trioxide. R. W. Kear. *Journal of Applied Chemistry*, v. 1, Sept. 1951, p. 393-399.

Results obtained confirm the view that a peak rate in corrosion exists at 20-45° C. below the dew-point of the gas and that the presence of carbon smokes can profoundly affect the extent of corrosion. Comparison of the behavior of filtered and unfiltered smoke-laden gases indicates that carbon reduces the SO_3 content of flue gases by physical adsorption. (R9, CN)

435-R. 15 Corrosion Case Histories in Petroleum Refineries. John F. Mason, Jr. *Oil and Gas Journal*, v. 50, Oct. 18, 1951, p. 114, 117, 119-124, 126.

Previously abstracted under similar title from *Petroleum Refiner*. See item 426-R, 1951. (R7)

436-R. The Prevention of Embrittlement Cracking. A. A. Berk. *Transactions of the American Society of Mechanical Engineers*, v. 73, Oct. 1951, p. 859-862; disc., p. 862-864.

Nitrate, quebracho tannin, and zero-caustic treatment were applied successfully in stationary plants to prevent cracking in embrittlement-detector specimens. On one large railroad, prevention of cracking in detector specimens has paralleled a spectacular decrease in boiler-seam cracking in locomotive engines. The principal conclusion from a survey of cracking in stationary boilers in the last ten years is that embrittlement is not a frequent occurrence. 14 ref. (R10, S21, ST)

437-R. A Standard Laboratory Corrosion Test for Metals in Phosphoric-Acid Service. H. F. Ebling and M. A. Scheil. *Transactions of the American Society of Mechanical Engineers*, v. 73, Oct. 1951, p. 975-987; disc., p. 987.

Some possible difficulties and their corrections. The relation between the laboratory test and field experience. A table of laboratory corrosion test results is presented as a guide in selecting metals for phosphoric-acid service. (R11, R5, SG-g)

438-R. Methods and Apparatus for Determining Resistance of Metals to Stress Corrosion. (In Polish.) E. Gasior. *Prace Glownego Instytutu Metalurgii*, v. 3, no. 3, 1951, p. 241-250.

Methods fall into two groups: those involving constant load and those involving constant strain. Details of both types (including diagrams) and their relative merits. 28 ref. (R11, R1)

439-R. Prevention of Corrosion in Naval Aircraft. Part I. N. E. Promisel and G. S. Mustin. *Corrosion*, (Technical Section), v. 7, Oct. 1951, p. 339-352; Nov. 1951, p. 377-388; disc., p. 388-389.

Conditions encountered and some of the methods used in combatting corrosion in naval aircraft. Some of the special problems which have been encountered and for which acceptable solutions have been found. A wide variety of metals and alloys is used in various aircraft parts. Photographs show typical corroded parts. Use of coatings and surface treatments. 18 ref. (R10, L general, T24)

440-R. Protection of Electric Equipment Against Corrosion. H. E. Springer. *Electrical Engineering*, v. 70, Nov. 1951, p. 956. (A condensation. To be published in *A I E E Transactions*, v. 70, 1951)

Ways to accomplish this are to remove the equipment from the corrosive atmosphere or to provide equipment designed to operate in it. (R10, T1)

441-R. Structural Changes Sabotage Corrosion-Resistant Liners. J. H. van Swaal. *Iron Age*, v. 168, Nov. 8, 1951, p. 138-142.

Corrosion resistant steels used as a liner material in chemical and petroleum industry apparatus frequently undergo structural changes which impair the liner's toughness. Types of corrosion resistant Cr-Ni steels. Mechanical properties and weldability characteristics. (R6, R7, Q general, K9, SS)

442-R. A Bibliography on Cathodic Protection. F. A. Rohrman. *World Oil*, v. 133, Nov. 1951, p. 286, 288.

Sixty-nine additional references to complete a bibliography published in the July issue. (R10)

443-R. Corrosion of Metals; Metals Under Stress: 1. Aluminium. P. F. Thompson. *Department of Supply, Aeronautical Research Consultative Committee, Commonwealth of Australia.* Report ACA-49, July 1950, 22 pages.

Time-potential curves were determined simultaneously of stressed and unstressed electrodes of commercially pure Al. The effects of aeration and deaeration of tap and salt water were determined for short and long-period applications of increasing stresses. Conclusions indicate that stresses are but contributory factors in the so-called process of "stress-corrosion". (R1, Al)

444-R. Relation Between the Nature and Sensitivity to Corrosion of Grain Boundaries of Aluminum-Magnesium Solid Solutions Containing 7% Magnesium. (In French.) Pierre A. Jacquet. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 233, Sept. 10, 1951, p. 621-623.

Electron-microscope investigation for a commercial Al alloy at 160-250° C. in an NaCl solution. (R11, M21, Al)

445-R. Developments in Corrosion and Corrosion Prevention of Iron and Steel. (In German.) Heinrich Steinrath. *Stahl und Eisen*, v. 71, July 19, 1951, p. 785-792; Aug. 16, 1951, p. 894-899.

Surveys literature published in 1948 and 1949. 324 ref. (R general, ST)

446-R. The Passivation of Tin-Plate. (In German.) W. Eilender. *Werkstoff und Korrosion*, v. 2, Aug. 1951, p. 289-292.

Passivating solutions are examined for hot-dipped and electrolytically coated tin plate for protection against sulfur compounds (food), oxidation on heating, and against atmospheric corrosion. Solutions of chromate had a favorable effect only when wetting agents or phosphates were added. Includes test-panel photographs. (R10, Sn)

447-R. Corrosion Resistance of Aluminum Bronze. (In German.) Erich Franke. *Werkstoff und Korrosion*, v. 2, Aug. 1951, p. 298-307.

Extensive data on corrosion resistance in various media under different conditions are tabulated. 45 ref. (R general, Cu)

448-R. Resistance Polarization. II. Its Change With Time and Resulting Predictions on Polarization Phenomena in Metal-Coating-Solution Systems. (In German.) Georg Falk, Martin Krieg, and Erich Lange. *Zeitschrift für Elektrochemie und angewandte Physikalische Chemie*, v. 55, July 1951, p. 396-404.

Experimental apparatus and procedure for investigating the behavior of corroding metals in aqueous solutions. Measurements were made on the systems of Pb and Ag with halogen acids and of Pb in H_2SO_4. 21 ref. (R11, Ag, Pb)

449-R. Variation of Rate of Solution of Steel in Sulfuric Acid With Pressure. (In Russian.) S. A. Balezin and A. G. Tulaeva. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 78, May 1, 1951, p. 75-77.

Influence of pressure on rate of solution of steel in acid in the presence of inhibitors and accelerators was investigated and causes of this influence studied. (R5, ST)

450-R. Accelerated Oxidation of Metals at High Temperatures. Anton de S. Brasunas and Nicholas J. Grant. *American Society for Metals,* Preprint 3W, 1951, 30 pages.

Certain metals which contain elements that form oxides of low melting point or high vapor pressure have been observed to be susceptible to "accelerated oxidation". It was found that the oxide formed on the 16-25-6 Cr-Ni-Mo alloy is a spinel having about 27% interconnected porosity. Atmospheric oxygen thus has easy access to the oxide-metal interface. Moving atmospheres which increase the rate of vaporization of volatile oxides definitely retard the oxidation rate of metals which form such substances during oxidation. Of the 16-25-6-type alloys only those containing more than 30% Ni were found to have satisfactory oxidation resistant properties. 17 ref. (R1, SS, SG-h)

451-R. Area Effects in Crevice Corrosion. O. B. Ellis and F. L. LaQue. *Corrosion* (Technical Section), v. 7, Nov. 1951, p. 362-364.

Specimens of stainless steel were prepared to provide an experimental approximation of a crevice relatively small with reference to the area outside exposed to the corrosive. Test panels were exposed to running fresh sea water for 87 days. Data confirmed expectations that extent of attack within a crevice was proportional to the area of freely exposed metal outside. This means that greatest danger exists when a crevice is associated with large area of freely exposed metal and that when area of metal outside a crevice approaches zero, extent of corrosion within a crevice also will approach zero and will be determined only by access of the corrosive medium and oxygen to surfaces within the crevice. (R1, SS)

452-R. Effect of Packaging on Corrosion of Zinc Plated Equipment. K. G. Compton, S. M. Arnold, and A. Mendizza. *Corrosion* (Technical Section), v. 7, Nov. 1951, p. 365-372.

Laboratory tests on equipment having Zn-plated parts produced corrosion to an extent comparable to that encountered in the field and which is known to be caused by condensation of atmospheric moisture. The greatest corrosion occurred when the parts were packed in plywood boxes, somewhat less in fiberboard, and least when packed in corrugated-paper boxes. The investigation also showed that a supplementary chromate treatment provides a marked increase in resistance to corrosion. (R3, Zn)

453-R. Historic Church's Copper Roof Good After 213 Years. A. W. Tracy. *Corrosion* (Technical Section), v. 7, Nov. 1951, p. 373-375.

Examination of English-made Cu sheets taken from the roof of Christ Church, Philadelphia, after 213 years' exposure, shows a weathering loss of 0.007 in. at thinnest areas, equivalent to a corrosion rate of 0.000033 in. per year. It is believed that the essentially rural character of the atmosphere during early exposure of these sheets contributed to their life. Recent corrosion tests on sheets in an industrial atmosphere show somewhat higher rates. Includes results of chemical analysis of the copper and of the corrosion products. (R3, Cu)

454-R. Performance of a Comprehensive Group of Coatings on Steel. Immersion and Atmospheric Exposures, 1949—. H. W. Mundt and L. J. Thompson. *Corrosion* (Technical Section), v. 7, Nov. 1951, p. 376.

Summary and conclusions from report on laboratory and short-term field-exposure performance tests for a comprehensive group of 159 corrosion and fouling retardant or preventive organic coating materials. These materials were used either separately or in combination in 139 protective systems which were applied to steel-panel specimens and exposed to seven different tropical environments. (R11, L26, ST)

455-R. Control of Sour Crude Corrosion in Kansas Production Operations. L. C. Case. *Corrosion* (Technical Section), v. 7, Nov. 1951, p. 390-396, disc., p. 396.

Corrosion prevention practice in Kansas which has resulted from many years' experimentation with resistant materials and methods of well treatment. Experimental materials have included plastic tubing, various alloy rods and tubing, galvanized tubing, plastic-coated, and cement-lined tubing. Treating methods have included exclusion of possible oxygen, neutralization agents and protective scale in addition to formaldehyde and oil wetting agents. Includes economic analysis. (R7, R10, L26, ST)

456-R. Corrosion Inhibition in Gas Condensate Wells By Intermittent Injection of Alkali Solutions. Charles C. Nathan. *Corrosion* (Technical Section), v. 7, Nov. 1951, p. 397-399.

Experiments carried on by producing research laboratory of Texas Co. in efforts to reduce corrosion in gas-condensate wells in which the casing is mudded off from the tubing. (R10, ST)

457-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 43, Nov. 1951, p. 113A-114A, 116A.

Effects of concentration and temperature on corrosion by H_2SO_4 of a Ni-base Ni-Mo-Cr alloy known as Chlorimet. (R5, Ni)

458-R. Action of Dilute Inorganic Acids on Stainless Steel. Charles F. Poe and R. M. Malcom. *Industrial and Engineering Chemistry,* v. 43, Nov. 1951, p. 2572-2575.

A study to determine what effects, if any, some of the more common inorganic acids have on a Cr-Ni stainless steel. 12 ref. (R5, SS)

459-R. Investigation of Certain Corrosion Inhibitors. (In Russian.) S. A. Balezin and S. R. Novikov. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 24, Mar. 1951, p. 283-288.

Inhibiting actions of formaldehyde, thiodiglycol, and henamethylenetetramine were investigated on steel plates containing 0.18% C. immersed in HCl and H_2SO_4 at room temperature. (R10, ST)

460-R. (Book) Corrosion—Causes and Prevention. Ed. 3. Frank N. Speller. 686 pages. 1951. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. $10.00.

Deals particularly with the ferrous metals. Explains corrosion, its kinds, and factors of its nature and occurrence. How to prevent corrosion in various fields of engineering work. New sections were added on biological influence and cathodic protection, and the most recent advances in practical preventives. (R general)

DON'T MISS—

A.S.M. Midwinter Meeting

William Penn Hotel, Pittsburgh

Jan. 31-Feb. 1, 1952

S

INSPECTION AND CONTROL

447-S. How to Inspect Screwthread Elements. William M. Stocker, Jr. *American Machinist,* v. 95, Oct. 15, 1951, p. 137-152.

Practical inspection methods; alternate measurement methods; how to save inspection time; common inspection errors; production planning; and salvage procedure. (S14, S13, T7)

448-S. Quality Control Charts Boost Forge-Shop Performance. R. D. Long. *American Machinist,* v. 95, Oct. 15, 1951, p. 154-155.

Longer die life, lower forging cost, and higher quality resulted from use of quality-control charts at International Harvester Co. (S12, F22)

449-S. Stainless-Steel Specifications. *American Machinist,* v. 95, Oct. 15, 1951, p. 163, 165, 167.

A tabular compilation of composition limits specified by various U. S. government agencies. (S22, SS)

450-S. Spectrochemical Analysis of Palladium and Platinum Sponge. J. E. Hawley, W. J. Wark, C. L. Lewis, and W. L. Ott. *Canadian Mining and Metallurgical Bulletin,* v. 44, Oct. 1951, p. 669-677; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, 1951, p. 425-433.

Reduction of platinum-group metals to the black form from either or both acid and alkaline media by means of aluminum has been shown to afford a convenient and accurate method of preparing both spectrographic standards and refinery sponge metals for spectrographic analysis. 16 ref. (S11, Pt, Pd)

451-S. Ordnance Using X-Rays to Inspect Complex Assemblies. George Elwers. *Iron Age,* v. 168, Oct. 25, 1951, p. 95-99.

Complex assemblies are inspected without disassembly by means of 22,000,000-volt X-rays, saving much time and labor. (S13)

452-S. A Note on a Simple Technique for Obtaining Absorption Coefficients of Metals and Alloys for Complex Radioactive Spectra. Frank E. Jaumot, Jr., and Foster C. Nix. *Journal of Applied Physics,* v. 22, Oct. 1951, p. 1294.

Technique involves dissolution in a solution of polyvinyl alcohol. Application to diffusion of Co in Co-Al alloys. (S19)

453-S. The Spectrochemical Determination of Zinc, Lead, and Iron in Copper and Copper Alloys. Frederick V. Schatz. *Journal of the Institute of Metals,* v. 80, Oct. 1951, p. 77-84.

Method suitable for routine plant-control determination of Zn, Pb, and Fe in brasses and leaded brasses. Factors important to accuracy of the analysis. (S11, Cu)

454-S. Variance Analysis Reduces Manufacturing Costs. John Pugsley. *Steel,* v. 129, Oct. 29, 1951, p. 78, 80, 82, 84-85.

A planned, intensive effort of the operating and accounting departments to reduce cost through elimination of unfavorable variances from standard resulting from operating performance. Application to blooming-mill supplies and yields, to coil breaks in electrolytic cleaning, and to flying-shear delays, at Tennessee Coal, Iron, and R. R. Co., Birmingham. (S12)

455-S. Spectrophotometric Analysis of Baths for Electrodeposition of Chromium. (In French.) Jean. "Chrome Dur" (Centre d'Information du Chrome Dur, Paris), 1950-51, p. 16-18.

Reviews the method on the basis of existing information. Theoretical

basis and practical applications. (S11, L17, Cr)

456-S. Experiments with Ultrasonics for Testing Sheet Metals, Castings, and Ceramics. (In German.) A. Dietzel. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.*, v. 28, June 1951, p. 299-302.

Equipment used to detect internal defects. (S13)

457-S. Industrial Metal Detector Design. Curtiss R. Schafer. *Electronics*, v. 24, Nov. 1951, p. 86-91.

How to design a metal detector for a specific application. Fundamental principles, basic equations and major design factors. A typical commercial industrial detector. 19 ref. (S10)

458-S. System of Studying Casting Defects. G. W. Nicholls and D. T. Kershaw. *Foundry Trade Journal*, v. 91, Oct. 4, 1951, p. 383-390; Oct. 11, 1951, p. 423-430; disc., Oct. 25, 1951, p. 473-478.

Previously abstracted from *Institute of British Foundrymen*, Paper 1003, 1951. See item 353-S, 1951. (S12, E general)

459-S. Cybernetics, a Super Science. George W. Slomin. *Iron Age*, v. 168, Nov. 1, 1951, p. 124-126.

The future trend in guiding research and development in the production of servo-mechanisms that can perform simple routine decisions. (S18)

460-S. Surface Finish Measurement; Comparison of Stylus and Optical Interference Methods. C. Timms and C. A. Scoles. *Metal Treatment and Drop Forging*, v. 18, Oct. 1951, p. 450-454.

By modifying a standard stylus instrument, surface-finish measurements by mechanical means are shown to compare favorably with those made with an interference microscope. (S15)

461-S. Liberal Use of Gage Blocks Pays Dividends. H. J. Chamberland. *Modern Machine Shop*, v. 24, Nov. 1951, p. 182, 184, 186, 188, 190, 192, 194, 196, 198, 200.

Several practical methods of obtaining maximum use of gage blocks. (S14)

462-S. X-Ray Spectroscopy of the Solid State. L. G. Parratt and E. L. Jossem. *Physical Review*, ser. 2, v. 84, Oct. 15, 1951, p. 362.

Fundamental mechanisms, with observations on KCl. This case is not unusual and many observations in X-ray spectroscopy of solids (both emission and absorption) may be similarly interpreted in terms of discrete atomic levels with consequent improvement in fit with expected energy position and line width, and with better understanding of forces in the solid state. (S11)

463-S. A Photographic Pyrometer. Donald W. Male. *Review of Scientific Instruments*, v. 22, Oct. 1951, p. 769-772.

Instrument indicates apparent surface temperatures by photographing hot surfaces and correlating the variable density of the photographic negative with the apparent surface temperature. The need for critically controlled photographic and development technique is eliminated by incorporating into every photograph the images of standard targets whose apparent surface temperatures are independently determined with an optical pyrometer. (S16)

464-S. Ford Hot Lab Tests Steel Production Applications of Atomic Energy. *Steel Equipment & Maintenance News*, v. 4, Oct. 1951, p. 14-15.

How radioactive isotopes produced from the uranium chain-reacting pile of the U. S. Atomic Energy Commission, Oak Ridge, Tenn., are being used in industrial research by Ford Motor Co. Specifically they are being applied to steelmaking, cupola practice, welding, and thickness control. (S19, ST)

465-S. Summary of the Research Work of the Trace Elements Section, Geochemistry and Petrology Branch, for the Period April 1, 1948-December 31, 1950. John C. Rabbitt. U. S. Atomic Energy Commission, TEI-148-A, June 1951, 96 pages.

Mineralogic and petrographic investigations of radioactive rocks, minerals, and ores; investigations of chemical methods of analysis for U, Th, and other elements and compounds in radioactive materials, and related chemical problems; investigations of spectrographic methods of analysis for a wide variety of elements in radioactive materials; and investigations of radiometric methods of analysis. (S11, EG-h)

466-S. Apparatus for Analyzing Gases Liberated During Attack on Metallurgical Products. (In French.) P. Vignial. *Bulletin de la Société Chimique de France*, July-Aug. 1951, p. 587.

Apparatus is used especially for determination of the percentages of metal and of alkaline carbides or alkaline-earth metals present in metallurgical products. (S11)

467-S. Determination of Magnesium in Cast Irons. (In French). **I. Spectographic Method.** Remi Paton. **II. Chemical Method.** Jacqueline Fuchs. *Fonderie*, Aug.-Sept. 1951, p. 2605-2612.

Principles and methods used for both types of analysis. Results and data. 15 ref. (S11, CI, Mg)

468-S. Continuous Control of Thickness of Sheet Material During Rolling. (In French.) A. Th. Wuppermann. *Métaux: Corrosion—Industries*, v. 26, July-Aug. 1951, p. 306-309.

A simple X-ray instrument developed by the Laboratory of Prof. Dr. Berthold. (S14, F23)

469-S. A Method for Determination of Hydrogen in Steels. (In French.) F. Meunier and A. Demarez. *Revue de Métallurgie*, v. 48, Aug. 1951, p. 598-608.

Method applicable to solid and liquid steels. Details of experiments and theoretical evaluation. The method gives results of high fidelity, particularly if the mean of two separate tests is taken. 45 ref. (S11, ST)

470-S. A Semicro Gas Analyzer. (In French.) L. Moreau and Ph. Albert. *Revue de Métallurgie*, v. 48, Sept. 1951, p. 684-686.

Apparatus for determination of gases in metals. The arrangement avoids exposing the operator to mercury vapor. (S11)

471-S. Determination of Oxygen in Steels by the Gotta Method. (In French.) J. Massinon, N. Stoll, and M. Urbain. *Revue Universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués a l'Industrie*, ser. 9, v. 94, Sept. 1951, p. 265-281.

Extensive study of the Gotta and other methods based on vacuum fusion. Results show satisfactory agreement. (S11, ST)

472-S. Plant Experience in the Nondestructive Testing of Metals. (In German.) Heinz Mayer. *Metall*, v. 5, Aug. 1951, p. 331-334.

Use of different magneto-inductive testing instruments for sorting and for detecting defects. (S10, S13)

473-S. Nondestructive Testing of Tungsten and Molybdenum Wire With the Aid of the Wire-Crack "Kawimeter". (In German.) E. Gromaodka. *Metall*, v. 5, Aug. 1951, p. 335-336.

An exceedingly sensitive instrument for detecting cracks and defects in wire too fine to be revealed by other methods. Typical cracks are illustrated by micrographs. Principle of operation of the "Kawimeter" is not indicated. (S13, W, Mo)

474-S. Desulfurization of Nickel. (In German.) O. Werner. *Metall*, v. 5, Aug. 1951, p. 323-328; Sept. 1951, p. 381-384.

Effect of sulfur and oxygen on the high-temperature ductility of Ni. Methods of determining S and Mg in Ni. 20 ref. (S11, Q23, Ni)

475-S. Rapid Analysis of Aluminum Alloys. (In German.) J. Eisen. *Metall*, v. 5, Oct. 1951, p. 436-441.

Procedures and laboratory layout for routine analysis of Al alloys for Cu, Mn, Mg, Fe, Si, Pb, and Zn. 14 ref. (S11, Al)

476-S. New Test Paper for Testing Porosity and Identifying Metals. (In German.) Artur Kutzelnigg. *Metalloberfläche*, sec. B, v. 3, Aug. 1951, p. B113-B115.

Importance of test papers is that the metals and metal coatings can be rapidly tested even by unskilled personnel. Photographs show appearance of test panels. (S10, S13)

477-S. Analytical Control of Potassium Cyanide Electroplating Baths. (In German.) W. Savelsberg. *Metalloberfläche*, sec. B, v. 3, Aug. 1951, p. B116-B117.

Determination of silver and carbonate content of the baths. (S11, L17)

478-S. Application of Nondestructive Testing Methods in the Rolling Mill. (In German.) Werner Jellinghaus and Hermann Moller. *Stahl und Eisen*, v. 71, Sept. 13, 1951, p. 995-1002.

Use of X-rays, ultrasonic frequencies, and magnetic fields for testing metals for defects, grain size, thickness, hardness, etc. (S13, S14, F23, ST)

479-S. Structure Rating Charts for Steel and Cast Iron. (In German.) Hans-Joachim Wiester and Gottfried Finke. *Stahl und Eisen*, v. 71, Sept. 13, 1951, p. 1002-1011.

Survey of literature includes standards for grain size, nonmetallic inclusions, heat treating, carbide segregation, graphite inclusions and formations, and pearlite content. 39 ref. (S22, M27, ST, CI)

480-S. Separating Mixtures of Aluminum-Alloy Chips by Sieving, Preceded, if Necessary, by Grinding. (In German.) August Buckeley. *Zeitschrift für Erzbergbau und Metallhuttenwesen*, v. 4, Sept. 1951, p. 329-334.

Proposed method of separating chips of different metals, alloys, etc., is based on the fact that the different metals and alloys differ in grain size and brittleness. Tables and graphs show that this simple method gives satisfactory results. (S10, A8, Al)

481-S. Platinum Rhodium Thermocouples and Their Industrial Applications. *Foundry Trade Journal*, v. 91, Oct. 25, 1951, p. 487-488.

Additional comments by R. C. Jewell and E. G. Knowles on above paper by Marcel Chaussain. See item 352-S, 1951. (S16)

482-S. Inspection of Investment Castings Utilizes X-Ray Equipment to Check Soundness. *Precision Metal Molding*, v. 9, Nov. 1951, p. 45-46. (S13)

T

APPLICATIONS OF METALS IN EQUIPMENT

455-T. New Plate Base and Backing Sheet. *American Pressman*, v. 61, Oct. 1951, p. 33-38.

Two new developments for the printing trade. One is a metal base for mounting plates to type-high that will remain permanently stable

and can be made in any printing plant. The second development is a lead alloy backing sheet which will simplify and speed up the mounting of 16-gage originals to patent base height. (T9, Pb)

456-T. Metals for Tomorrow's Transports. Leo Schapiro. *Aviation Age,* v. 16, Oct. 1951, p. 38-41.

See abstract of "Modern Trends in Airframe Materials," *Metal Progress,* item 215-T, 1951.
(T21, Q general, AY, Ti)

457-T. Tantalytic Capacitors. L. W. Foster. *General Electric Review,* v. 54, Oct. 1951, p. 30-38.

Tantalytic is the General Electric trade name for a foil-type electrolytic capacitor the electrodes of which are made of the metal tantalum. Theory of the electrolytic capacitor, electrical and chemical aspects, construction, and typical characteristics. Production, properties, and applications of Ta. Present and potential applications of the capacitors. (T1, Ta)

458-T. Aluminum Alloys. H. W. Fritts and E. D. Verink, Jr. *Industrial and Engineering Chemistry,* v. 43, Oct. 1951, p. 2197-2199.

Applications in the chemical, petroleum, and food industries. Use of Al in power plant operations is also discussed. 49 ref. (T29, T25, Al)

459-T. Characteristics of Zinc Plates for Lithographing. A. G. Arend. *Industrial Chemist and Chemical Manufacturer,* v. 27, Oct. 1951, p. 456, 463.

Factors which influence the performance of Zn plates when used for lithographic purposes, and some simple procedures for testing. (T9, Zn)

460-T. Modern Flat Refractory Arches Promote Heating Furnace Economy. N. W. Roudabush, D. E. Jones, and C. E. Grigsby. *Industrial Heating,* v. 18, Oct. 1951, p. 1878, 1880, 1882, 1884, 1886, 1888, 1890.

Advantages from the mechanical viewpoint in forge shops and other locations where vibration tends to break down conventional arches.
(T5, B19)

461-T. The Growth of Magnesium. J. D. Hanawalt. *Modern Metals,* v. 7, Oct. 1951, p. 30-31, 33.

Study of long-term growth curves in metals and a review of significant developments since World War II indicate that the Mg industry is now on the eve of assuming its logical position as one of the four major structural metals. (T26, Mg)

462-T. Photographs in Aluminum. Eugene Wainer. *Modern Metals,* v. 7, Oct. 1951, p. 34-36, 38.

The "Aluphoto" process—a recent Swiss invention—by which photographs may be made on an Al base. Anodized Aluphoto plates are said to be highly resistant to heat, abrasion, weather and water, as well as to chemical attack by many acids, solvents, hot oils, and foodstuffs. They also exhibit some superior photographic properties. Important potential uses. (T9, L19, Al)

463-T. Aluminum Splices and Deadends Cut Construction Costs. *Modern Metals,* v. 7, Oct. 1951, p. 43, 45.

Strandlink and Strandvise are the trade names of two new connection devices designed to hold steel-strand messenger, static, and guy wires. Fabricated from Al tubing, they are actually stronger than the stranded-steel wire they are used with. Al was chosen because of its corrosion resistance, its workability before heat treating, and its higher strength afterward. (T7, Al)

464-T. Textiles Turn to Aluminum. *Modern Metals,* v. 7, Oct. 1951, p. 54-56.

Varied uses of Al in the textile industry, indicating advantages over materials previously used. (T29, Al)

465-T. How to Produce Plastic Die Models. J. W. Richards. *SAE Journal,* v. 59, Oct. 1951, p. 32-33.

Proceedings of round-table discussion. New processes and materials aimed at improving casting techniques and making plastic models stronger and less subject to internal stress and accompanying warpage. (T5)

466-T. Research Uncovers Materials for Supersonic Engines, Missiles. A. H. Allen. *Steel,* v. 129, Oct. 22, 1951, p. 78, 80.

Surveys results of recent NACA research. Improved means of cooling turbine buckets and disks, giving a 95% saving in strategic alloy requirements, were developed. Time-lag compensators, electromagnetic flowmeters, hot-gas thermocouples, and electronic computers are other recent products of advanced studies in flight propulsion. (T25, T2)

467-T. Here's a Nut They Couldn't Crack. *Steel Horizons,* v. 13, Fall 1951, p. 10-11.

New type stainless steel locknuts used in jet-airplane and racing-automobile engines for added safety. Tests have shown that they are able to withstand temperatures up to 1600° F. without becoming loose or stricken with seizure.
(T7, K13, SS)

468-T. Powder Metal IF Cores. John P. Tucker. *Television Engineering,* v. 2, Oct. 1951, p. 22-23.

Production and use of finely divided Fe powder core with phenolic resin as a binder and insulator, for use in intermediate frequency (IF) transformers. (T1, H general, Fe)

469-T. Problems and Progress in Manufacturing Bolts, Nuts and Rivets. W. E. Hill. *Wire and Wire Products,* v. 26, Oct. 1951, p. 940, 982-986.

Surveys trends from the practical viewpoint. Drawing lubricants, carbide dies, and problems involved in making steel to be used for bolts, nuts and rivets. (T7, G10, ST)

470-T. Influence of Chemical Composition and Structure of Iron on Ingot Mold Life. (In Polish.) E. Bucko. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 3, 1951, p. 183-200.

Results of tests on 79 square big-end-down molds used for pouring 5-ton ingots. Relation of duruability to chemical composition and microstructure. Results are summarized in English abstract. 19 ref.
(T5, D9, Fe)

471-T. Properties and Uses of Aluminum Foil in Packaging. T. M. Hill. *American Paper Converter,* v. 25, Nov. 1951, p. 14, 46, 48.

Mechanical properties, effects of variations in thickness, pinholes and what to do about them, and converted foil products.
(T10, Q general, Al)

472-T. New Dyeing Processes Utilize Metals in Finishing Textiles. *Chemical and Engineering News,* v. 29, Nov. 5, 1951, p. 4676-4678.

How molten metal of the fusible alloy type is used in a bath for fixing color. Copper dyeing of acrylonitrile fibers is shown to have wide application. (T29, Cu)

473-T. Manganese Steel in Tin Dredgers. *Edgar Allen News,* v. 30, Oct. 1951, p. 979-980.

Use of Mn steel castings.
(T28, AY)

474-T. Aluminum Triplex Cables for Secondaries and Services. I. Sam J. Pearson. *Electric Light and Power,* v. 29, Oct. 1951, p. 112-114.

Application of Al. (T1, Al)

475-T. New Generators Save Copper, Steel. *Iron Age,* v. 168, Nov. 1, 1951, p. 127.

A new generator design by Westinghouse Electric Corp. permits generation of more electric power while using less Cu and steel.
(T25, Cu, ST)

476-T. Corrosion-Resistant Metals for the Pulp and Paper Industry. Daniel L. Horigan, *Paper Trade Journal,* v. 133, Oct. 5, 1951, p. 24, 26, 28, 30, 32; Oct. 12, 1951, p. 20, 22, 24, 26.

Part I: The various types of corrosion apt to be encountered. Second part: Properties of the various corrosion resistant metals and forms in which these metals are available. Final part: Specific applications in pulp and paper processing. (T29, R general, SG-g)

477-T. Carbides Cut Costs. J. Van Eaton. *Production Engineering & Management,* v. 28, Nov. 1951, p. 62-64.

The utilization of carbide-insert tools. Performance data. (T6, C-n)

478-T. Tool Steels Developed for Varied Applications. C. B. Post. *Steel,* v. 129, Nov. 12, 1951, p. 84, 89, 98.

Improved manufacturing techniques in the toolsteel industry lead to production of steels of high impact strength, high fatigue resistance, high hardness, resistance to wear and abrasion, and ability to heat treat for desired properties.
(T6, TS)

479-T. Aluminum Containers Stretch Tin Supply. G. W. Birdsall. *Steel,* v. 129, Nov. 5, 1951, p. 97-98.

Tin-can protection without "tinplate" is afforded by several different types of packages which use Al alone or Al combined with paper, wax, plastic, or fiber materials.
(T10, Al)

480-T. New Type Coaxial Cable Permits Applications in 1,000-10,000 MC Range. Bernard F. Osbahr. *Tele-Tech,* v. 10, Nov. 1951, p. 42-43, 107-108, 110-111.

A German development. The cable features a multi-layer tape insulating-helix of polystyrene and extruded Al sheath. It has ability to transmit radio frequencies up to 10,000 mc. (T1, Al)

481-T. Prefabricated Aluminum Facing Panels. (In French.) Maurice Victor, Jean Blanchot, and Lucien Alff. *Revue de l'Aluminium,* v. 28, July-Aug. 1951, p. 279-283.

Remodeling of the Exhibition Hall of the City of Lille. Construction details, particularly of the facade with its light-alloy panels, balconies, and scaffolding in several colors. (T26, Al)

482-T. Treatment of Burns With Thin Aluminum Foils. (In French.) Pierre Prevot. *Revue de l'Aluminium,* v. 28, July-Aug. 1951, p. 284-287.

Canadian experiments show advantages over grease-base dressings, as wounds do not exude and grafting becomes possible earlier. Al was better than Au, Ag, Sn, or Ta. Therapeutic results. (T10, Al)

483-T. Scientific Principles of Regenerator Design and Practical Conclusions. (In German.) Alfred Schack. *Stahl und Eisen,* v. 71, July 19, 1951, p. 773-776.

Correlations between heating area, thickness of brick, heat storage capacity, and stability of checkerwork. Design of an ideal high-efficiency blast regenerator. (T5)

484-T. Effect of High-Strength Steels on Weight Reduction and Design in Steel Bridge Construction. (In German.) O. Erdmann. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 93, July 21, 1951, p. 678-680.

Experiments to determine why the use of high-strength steels failed to produce the expected reduction in the weight of steel bridges. (T26, Q23, CN)

485-T. Aluminum Pontoon Bridges at the Zurich 600th Anniversary Celebration. (In French and German.) *Aluminium Suisse,* Sept. 1951, p. 159-161.
(T26, Al)

486-T. Recent Applications of Aluminum in the Heavy Chemical Industry. (In French and German.) P. Juniere. *Aluminium Suisse,* Sept. 1951, p. 163-172.
(T29, Al)

487-T. Aluminum in Radiant-Heating Systems. (In French and German.) Henri J. Blondel. *Aluminium Suisse,* Sept. 1951, p. 173-180.
Describes, diagrams and illustrates a series of applications.
(T27, Al)

488-T. Improved Components and Materials for Reliable Electronic Equipment. A. W. Rogers and B. A. Diebold. *Electrical Manufacturing,* v. 48, Nov. 1951, p. 114-119, 270, 272, 274, 276, 278, 280.
Miscellaneous developments resulting from Signal Corps research sponsorship. The report reviews a number of completed projects in components and materials; gives a "work-in-progress" picture of current and planned projects; and restates the requirements for reliability that arise from the concepts of modern warfare. Covers Ta electrolytic capacitors, as well as various applications of ceramics, plastics, coatings, impregnants, rubbers, etc. 14 ref. (T1, Ta)

489-T. Low-Cost Processing of Alnico Rotors and Stators. J. H. Stark. *Electrical Manufacturing,* v. 48, Nov. 1951, p. 125-127, 248, 250, 252, 254.
Critical supply position of basic Alnico materials underscores economies possible in processing techniques. An analysis of such factors in terms of motor and generator redesign evolution. Casting, machining, powder metallurgy, and other fabrication processes, as well as design principles.
(T1, G17, E general, H general, SG-n)

490-T. A New Metal Permits Ideal Gaging Conditions. E. Vanko. *Magazine of Tooling and Production,* v. 17, Nov. 1951, p. 94-95.
New material is a TiC combination known as "Demark", made by Pipe Machinery Corp. for use in thread gaging. (T8, S14, Ti, C-n)

491-T. Aluminium in Structural Engineering. W. C. Devereux. *Metal Industry,* v. 79, Oct. 12, 1951, p. 319-321; Oct. 19, 1951, p. 344-345.
Design, welding, corrosion resistance, and choice of material.
(T26, Al)

492-T. Circular Steel Sets Economical at Miami. J. W. Still. *Mining Engineering,* v. 3, Nov. 1951, p. 940-942.
Circular steel sets have proved to be more economical than timber for supporting slusher drifts in the block-caving mining used by the Miami Copper Co., Miami, Ariz.
(T28, CN)

493-T. Tight Fittings for Glass Pipe by Die Casting. *Precision Metal Molding,* v. 9, Nov. 1951, p. 35.
Die-cast Al flanges. (T7, E13, Al)

494-T. Chemical Equipment Designed for High Production With Die Casting. *Precision Metal Molding,* v. 9, Nov. 1951, p. 27, 58-59.
Die-cast Al parts are used in "Chlorinet", a device for controlled drinking-water sterilization.
(T29, Al)

495-T. (Book) **Aluminum in the Chemical and Food Industries.** Ed. 2, 150 pages. 1951. British Aluminum Co., Ltd., London, England.
Succeeds 1936 edition. Chapter 1: The general properties of Al and its alloys and all the characteristics which render the metal a particularly suitable material for use in the chemical and food industries. Chapter 2: The action of various substances on aluminum and its alloys. Chapter 3: Methods of testing corrosion resistance, preparation of specimens, exposure conditions, etc. Selected bibliography and comprehensive index.
(T29, R general, Al)

V

MATERIALS
General Coverage of Specific Materials

156-V. Titanium—1951. Joseph A. O'Connor. *Chemical Engineering,* v. 58, Oct. 1951, p. 136-139.
Processes, plants, production, and possibilities. (Ti)

157-V. Cast Alloy Reference Sheet. N. S. Mott. *Chemical Engineering Progress* (Engineering Section), v. 47, Oct. 1951, p. 542.
Data on machinability, heat treatment and weldability of low-carbon 18-8 stainless. Mechanical and physical properties, as well as corrosion resistance to a large number of common chemicals, are tabulated.
(R5, SS)

158-V. Nickel-Silver Castings. James S. Vanick. *Foundry,* v. 79, Nov. 1951, p. 92-95, 254-258.
Varied applications, mechanical properties, corrosion resistance, cleaning and finishing, foundry practice, and effects of alloying agents. (Cu)

159-V. Wrought Copper and Copper-Base Alloys. C. L. Bulow. *Industrial and Engineering Chemistry,* v. 43, Oct. 1951, p. 2218-2226.
Reviews the literature on alloy compositions, specifications, mechanical and physical properties, fabrication properties and techniques, and corrosion resistance of copper and copper alloys under a wide variety of conditions. 162 ref. (Cu)

160-V. Iron, Mild Steels, and Low-Alloy Steels. C. P. Larrabee and B. J. Kelly. *Industrial and Engineering Chemistry,* v. 43, Oct. 1951, p. 2239-2242.
General trend in the literature during the past year. Spheroidal cast iron has continued to find increased use as an engineering material. From the performance data gathered to date it is expected that nodular graphite cast iron will replace other grades for many uses. 49 ref. (ST, AY, CI)

161-V. Nickel and High-Nickel Alloys. H. O. Teeple. *Industrial and Engineering Chemistry,* v. 43, Oct. 1951, p. 2242-2251.
Development of new alloys or improvements in present ones and studies of their physical properties; developments in the fabrication and working of these alloys; and developments in the applications of these alloys with particular reference to the chemical and process industries. 231 ref. (T29, Ni)

162-V. Stainless Steels and Other Ferrous Alloys. Walter A. Luce. *Industrial and Engineering Chemistry,* v. 43, Oct. 1951, p. 2258-2271.
Comprehensive literature survey. Methods for reclaiming critical elements and substituting Ti for Cb. The sigma phase, its nature, occurrence and effects on stainless steel. Data on corrosion and heat resisting alloys and application in industry. A resume of stainless-steel production procedures. 328 ref.
(SS, SG-g, h)

163-V. Tin and Its Alloys. Robert J. Nekervis. *Industrial and Engineering Chemistry,* v. 43, Oct. 1951, p. 2272-2275.
A literature review. Developments in electroplating, solders, and basic research are emphasized. 147 ref.
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(Al)

168-V. Thermostatic Bimetals. (In Polish.) E. Zalesinski. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 3, 1951, p. 255-258.
Forms, compositions, applications, methods of casting, surface treatment before bonding, and rolling.
(SG-s)

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Production of chromium carbide. Applications in which resistance to wear, corrosion, and heat are a must. Uses of tungsten carbide.
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Various types made in France, their mechanical properties, and their thermal treatment. (CI)

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Production and properties. Its high resistance to corrosion makes it an ideal metal for bright finishing of certain articles.
(L general, T general, Al)

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Surveys properties and applications. (Re)

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Occurrence of antimony in Brazil and its distribution in the rest of

the world, its physical and chemical properties, use, production, smelting, and role in industry. Diagrams show ore-beneficiation flowsheets and smelting and refining equipment. (B10, C21, Sb)

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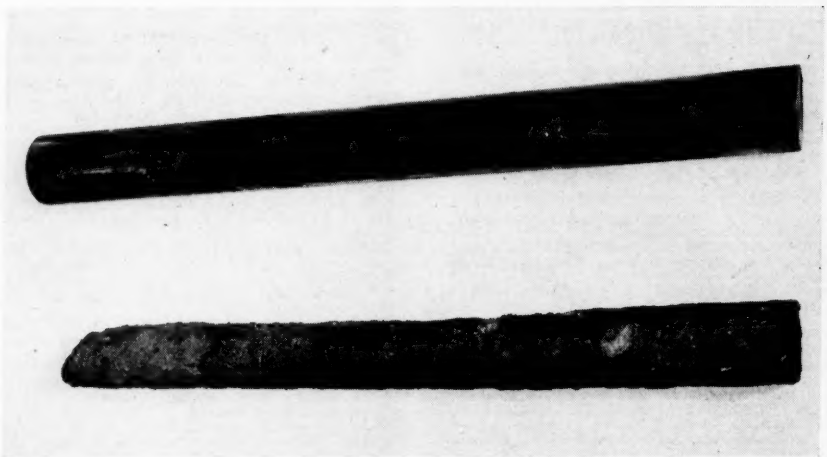

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